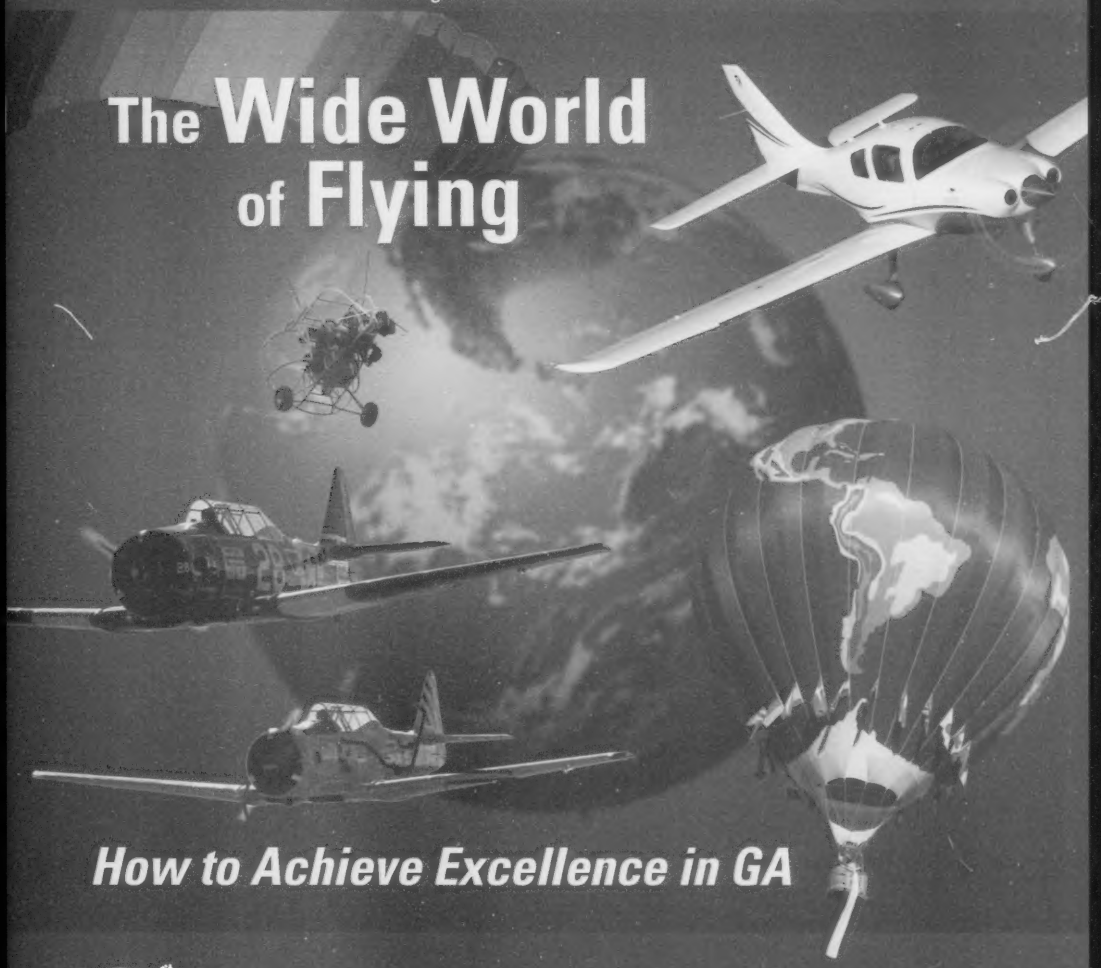
FAA Safety BRIEFING

September/October 2011

Your source for general aviation news and information



The Wide World of Flying

How to Achieve Excellence in GA

Federal Aviation Administration

www.faa.gov/news/safety_briefing

The September/October 2011 issue of FAA Safety Briefing *presents the wide world of flying and showcases many of the training and educational opportunities available in aviation. Articles highlight the benefits of seeking out and sharpening your general aviation skill set.*

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Jumpseat

JOHN ALLEN
DIRECTOR, FLIGHT STANDARDS SERVICE

Keep Learning

Seneca — the venerable Roman philosopher, not the venerable Piper-built twin — once offered some good advice about life: "As long as you live, keep learning how to live." Given what I do for a living these days as director of the FAA's Flight Standards Service, I'd like to reframe that advice a little: *As long as you fly, keep learning how to fly.* If there is anything I have learned about aviation and good airmanship in more than thirty years as a pilot, instructor, and evaluator, it is that a good pilot never stops being a student of all the lessons and opportunities that aviation has to offer. That's why this issue of *FAA Safety Briefing* focuses on the wide world of flying.

Lifelong Learning

In the last issue, I wrote about my vision to establish a U.S. National Aviation Academy that would attract, train, and mentor the best and brightest of our youth. Part of the goal is to address pilot retention issues and support the vital U.S. aviation sector's role in our national economy. A more fundamental goal, though, is to enhance safety and airmanship by instilling a core commitment to continued learning. And because lifelong learning is key to a long life in flying, we specifically need to teach our pilots *how* to keep learning.

Let me stress that the lifelong learning goal is not confined to the vision of a U.S. National Aviation Academy. On the contrary, one of my job priorities is to find ways to ensure that our flight training certification standards produce competent, confident, skilled, well-rounded pilots who are fully prepared to assume command of their aircraft in all situations.

There are a number of things we're already doing to advance that goal. As you may know from reading the news, congressional passage of Public Law 111-216, commonly known as the Airline Safety and Federal Aviation Administration Extension Act of 2010, requires the FAA to establish a number of new standards for pilot training, as well as develop best practices for pilot professionalism and professional development.

In addition to what Congress has directed, the FAA is looking at other ways to improve pilot training. As this issue goes to press, for example, we are in the process of chartering a government/industry steering committee to help us update and improve the quality of our pilot/instructor training and testing materials.

Quality Counts

And speaking of quality ... Although PL 111-216 sets minimum hours for certification in certain areas, I firmly believe that for any certificate or rating, the *quantity* of training is less important than the *quality* of training. And you don't need rules to improve the quality of the flying and training you do on your own. As some of this issue's articles observe, you can learn a lot from doing commercial maneuvers, or adding a glider rating to your pilot certificate. Also, consider how basic aerobatic training can give you not only a lot of fun, but also a lot more knowledge, confidence, and skill in handling your aircraft.

Lifelong learning is key to a long life in flying. As long as you fly, keep learning *how* to fly.

I also believe that we can be much smarter, and much more effective, with highly targeted use of simulators at both ends of the spectrum. At the entry level, use of Aviation Training Devices offers the opportunity for much better training on both routine procedures and with emergencies. The addition of affordable motion-capable devices to this part of the flight training community is a welcome development. And in the air carrier world, which has long benefited from sophisticated full-motion devices, I am encouraging consideration of how focused use of less expensive devices (including those without motion) can provide effective and perhaps more frequent refresher training.

It really is a wide world of flying – so never stop learning to enjoy it.

ATIS Aviation News Roundup

FAA Issues New Guidance for MET Towers

In response to pilot concerns about the limited visibility of meteorological towers (MET) less than 200-feet high, and erected in remote and rural areas, the FAA issued guidance last June for voluntary markings that will help make these towers more conspicuous. Under current regulations, towers under 200-feet are not required to follow the notice requirements in 14 CFR part 77 and do not require an FAA aeronautical study. As a result, many new METs are being constructed just under the 200-foot mark and can be erected often in a matter of hours. The lack of lights and colored markings can make these METs difficult to distinguish, especially for aerial applicators, law enforcement, helicopter emergency medical evacuation services, and other operators that conduct low-altitude operations.

FAA has issued guidance for voluntary markings to make METs more noticeable.

To address this issue, the FAA issued a notice of policy that recommends METs 200 feet and shorter be painted entirely with alternating bands of aviation orange and white. The guidance also recommends using orange-colored spherical markers along with high visibility sleeves or flags to help pilots identify the supporting guy wires. The FAA recommends that landowners and developers refer to the guidance in Advisory Circular (AC) 70/7460-1K, Obstruction Marking and Lighting for the voluntary marking of METs less than 200 feet high.

The number of cell phone, wind energy, and other towers erected throughout the United States in agricultural regions has increased significantly over the past several years, and the increase is projected to continue into the future. To help pilots deal with the risk from METs, the FAASTeam has developed a new brochure (www.faa.gov/pilots/safety/pilotsafetybrochures/) highlighting several safety tips. One preflight task that can help you stay safe is to see if your state maintains a tower registry on the Internet. Then check your route of flight for any possible overlap. You are also strongly encouraged to conduct an overflight of a work area from a safe altitude to check for obstructions before descending to altitudes where these towers may be present.

New Website Helps Pilots Avoid Midair Collisions

A new website hosted by the FAA (in conjunction with the Department of Defense) aims to advance aviation safety by promoting an enhanced information exchange between the civilian and military flying communities. The website (www.SeeAndAvoid.org) allows users to find and link to all existing military Mid-Air Collision Avoidance (MACA) programs from a single location, while also enjoying new access to information from military bases that did not previously have web-based content. The goal is to eliminate midair collisions and reduce close calls through continuous flight safety and proper flight planning.

Since 1978, there has been an average of 30 midair collisions in the United States each year, resulting in an average of 75 deaths each year. There are also over 450 Near Midair Collisions (NMACs) reported each year; no one can calculate the number that have gone unreported. Particularly in cases where military and civilian aircraft come into close proximity, lack of basic information regarding military flight characteristics creates

problems among civilian pilots. The SeeAndAvoid.org website helps offer a solution to this by providing a centralized, credible resource that provides civilian and military pilots with reciprocal information and education on airspace, visual identification, aircraft performance, and mutual hazards to safe flight.

The interface is also simple to use with point-and-click interaction, predominately using Google maps and graphics for ease of use. Try it today and make it a part of your preflight planning!

Academia Symposium Explores Ideas in Aviation Safety

On Thursday, July 14, 2011, the FAA held its first annual Academia Symposium in Norman, Okla., to help improve GA safety and enhance relations with the collegiate aviation community. Hosted by the University of Oklahoma, the event gathered a nationwide panel of aviation experts from government, industry, and academia, to discuss and brainstorm ideas on how to leverage collaborative opportunities to advance aviation safety.

Topics discussed included: the future of aviation medicine, professionalism and decision making, the role of CFIs and examiners, and the various applications of safety measuring and monitoring programs, such as Safety Management Systems (SMS), Flight Data Monitoring (FDM), and the Aviation Safety Action Program (ASAP).

"This symposium is historic," said FAA Administrator Randy Babbitt, who addressed attendees via a video message. "We are reaching out to accredited universities in a concerted effort to enhance general aviation safety ... to create the best training practices."

Also speaking at the symposium was Director of FAA Flight Standards Service John Allen, who discussed his vision of engaging the aviation education community by creating a U.S. National

Photo by Tom Hoffmann

Aviation Academy. "The aviation sector is vital to our nation's economy and we need to attract, train and retain pilots and AMTs," said Allen. "A national aviation academy would help us improve the sophistication of airmen training and qualification, and help entice younger generations to study science and math ... as well as choose aviation for a career."

The unique knowledge and ideas shared at this symposium will be reviewed and later reported out by a panel of education experts at the University Aviation Association's Fall Education Conference in October 2011 and at the Aviation Accreditation Board International Winter Meeting in 2012. The panel will also deliver suggestions to the FAA on how to apply these ideas to non-institutional training and GA operations.

FAA's GA Division Gets New DC Digs

On June 3, 2011, the General Aviation and Commercial Division of FAA's Flight Standards Service relocated to a new office building approximately 1.5 miles from the headquarters in Washington, D.C. The physical address of the new location is 55 M Street, SE, however, any mail should still be sent to the previous address for the time being at 800 Independence Ave, SW, 20591.

"The move to M Street represents the agency's leadership commitment to general aviation," says Division Manager Mel Cintron. "In addition to providing the division with more modern office facilities, the new location also allows for growth, better team cohesion, and efficiencies which were not previously possible."

In The Next Issue...

Airports come in all shapes and sizes. They range from simple 400-foot grass strips to the size of a small city, and accommodate everything from ultralights to million-pound jumbo jets. Join us in the next issue of *FAA Safety Briefing* as we explore the bustling world of runways, taxiways, and terminals and learn "All About Airports."

JAMES WILLIAMS

From 0 *to* 500

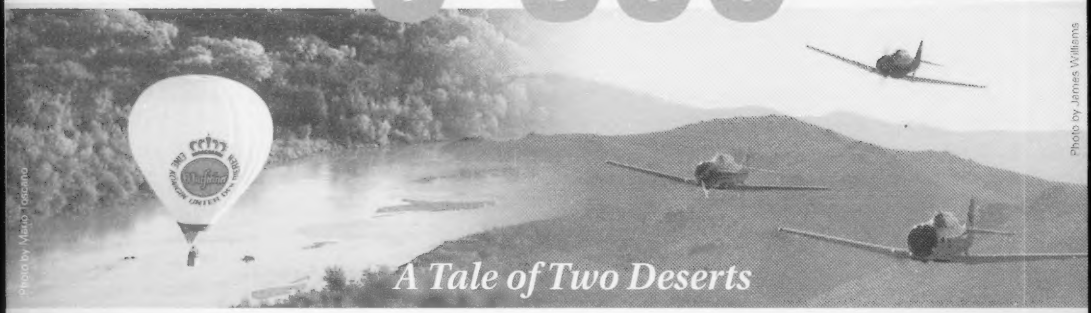


Photo by Mario Gaeta

Photo by James Williams

A Tale of Two Deserts

Whether it's screaming down the "Valley of Speed" over the Nevada desert or floating gently over picturesque New Mexico, flight training and discipline are critical. The two major aviation events taking place this fall illustrate the point.

In September, the sky over Reno-Stead Airport will fill with a variety of aircraft ranging from classic biplanes, to home built speedsters, to roaring modified warbirds at the annual Reno National Championship Air Races. In order to prepare for those laps, participants train carefully, including attendance at the Pylon Racing Seminar (PRS), otherwise known as "Rookie Camp."

PRS was born from the need to ensure that pilots have proper training and qualifications to compete in such a demanding environment. Every June, new pilots arrive in Reno ready to learn and ready to test their skills on the course with other pilots. They learn from instructors with extensive experience in flying very fast, very close to the ground. Not only do they have to learn how to do it on their own, but they also have to learn to fly low and fast with other airplanes only feet away. PRS includes not only hands on flying experience, but also classroom instruction to familiarize pilots with how the air races work and with the many rules of the race.

Whereas Reno is about precision at speed, Albuquerque is about planning and reading the environment.

In addition to first time pilots, all pilots wishing to move to a higher racing class and those who have not raced in two years must attend PRS to train or requalify. While it is certainly a learning atmosphere, the postflight debriefings can be very pointed and critical. That's because the stakes are incredibly high and tolerance for error is incredibly low. This focus on training and discipline makes perfect sense in a world where even a small mistake could be fatal. PRS enhances safety by providing a safe environment for pilots to train, learn from their mistakes, and make corrections before they race for real. Finally, Reno race pilots must pass a checkride before they are allowed to fly in the event.

In October, the New Mexico skies will be painted every color of the rainbow during the Albuquerque International Balloon Fiesta, widely considered the world's premier balloon event. While the Balloon Fiesta is very different from the Reno Air Races, it too features well-trained and highly skilled pilots. Whereas Reno is about precision and speed, Albuquerque is about planning and reading the environment. In a balloon, airspeed is low, and the controls are far less direct and immediately effective. During the Fiesta, pilots test their skills by participating in mass ascensions, skill competitions, and races.

These two events perfectly showcase the extreme differences and wide variety of the general aviation world. But in both cases they highlight the need for high quality training, and provide lessons we can all learn and use.

James Williams is FAA Safety Briefing's assistant editor and photo editor. He is also a pilot and ground instructor.

FREDERICK E. TILTON, M.D.
FEDERAL AIR SURGEON

Aeromedical Advisory

I Can See Clearly Now...

According to our records, about 55 percent of civilian pilots use some form of vision correction. While most of these pilots use glasses or contact lenses, a growing number are opting for laser eye surgery. In most cases these surgeries have good outcomes, but you should be aware that they can have side effects that could create a problem for your medical certification. As the technology improves, and with proper patient selection, potential side effects have decreased in severity and occurrence rate, but they still exist.

Advances in Laser Eye Surgery

There is no question that the technology for laser eye surgery has improved since it was first approved by the Food and Drug Administration (FDA) in 1995. The complication rate is less, and the resulting visual acuity is typically better than with earlier methods. The range of available procedures has also increased. However, they all include laser resurfacing procedures, which change the optics of the front of the eye, and the way light rays focus on the retina to form an image in the brain.

Some recent technical improvements include: faster lasers, better methods of application and eye tracking, laser flap incisions, and wavefront optimized procedures. Wavefront technology maps eye optics in three dimensions, which can reduce some of the downsides of laser refractive surgery, including contrast sensitivity loss, problems with night vision, and halos. Some patients can even achieve "super vision," i.e., better than 20/20 vision.

Patient selection is extremely important; some people's eyes are predisposed to problems that could impact which procedure, if any, is selected. Individuals at risk include those with thin corneas, dry eyes, inflammatory conditions, and glaucoma, among others.

Keep in mind that with laser eye surgery there are a number of possible complications and adverse effects, many of which are listed in our *Information for Pilots Considering Laser Eye Surgery* brochure www.faa.gov/pilots/safety/pilotsafetybrochures/media/LaserEye_II.pdf.

What About My Medical?

The FAA requires that civil airmen with refractive surgical procedures discontinue flying until their eye care specialist has determined that their vision is stable, and that there are no significant adverse effects or complications. The healing should be sufficient that frequent eye drops are no longer required and the quality of vision is good. The airman should submit one of two documents to the FAA: A report from the eye care specialist or FAA form 8500-7, *Report of Eye Evaluation*. (NOTE: The FAA would prefer FAA form 8500-7 because it indicates all the eye information we would need to process a physical examination.) These reports can be submitted directly to the Aerospace Medical Certification Division or your Regional Flight Surgeon office when you are released from care, or to the Aviation Medical Examiner during your next flight physical.

If you are a pilot contemplating refractive surgery, consult an eye care specialist to determine if you are a good candidate for laser refractive surgery. Although the FAA and most major air carriers allow laser refractive surgery, professional aviators should consider how it could affect their occupational and certification status. As with any invasive procedure, there are many variables that can influence the final outcome. You should understand all the risks as well as the benefits before electing to have a procedure performed that could compromise your visual performance in the cockpit.

Frederick E. Tilton, M.D., M.P.H., received both an M.S. and an M.D. degree from the University of New Mexico and an M.P.H. from the University of Texas. During a 26-year career with the U.S. Air Force, Dr. Tilton logged more than 4,000 hours as a command pilot and senior flight surgeon flying a variety of aircraft. He currently flies the Cessna Citation 560 XL.

Fast-track Your Medical Certificate

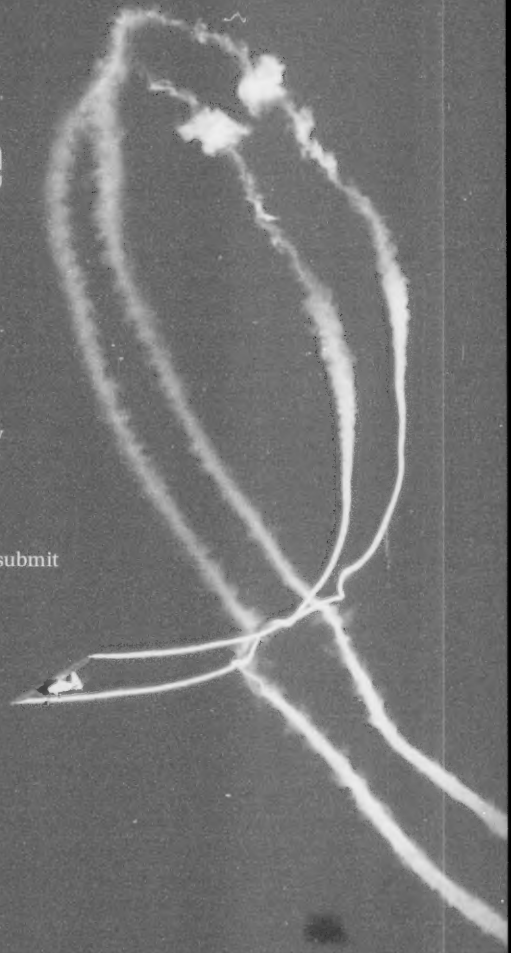
With FAA MedXPress, you can get your medical certificate faster than ever before.

Here's how: Before your appointment with your Aviation Medical Examiner (AME) simply go online to FAA MedXPress at https://medxpress.faa.gov/ and electronically complete FAA Form 8500-8. Information entered into MedXPress is immediately transmitted to the FAA and forwarded to your AME before your medical examination.

With this online option you can complete FAA Form 8500-8 in the privacy and comfort of your home and submit it before your appointment.

The service is free and can be found at:

https://medxpress.faa.gov/



DR. WARREN S. SILBERMAN

Ask Medical Certification

Dr. Warren S. Silberman and his staff administer the aeromedical certification program for about 600,000 holders of U.S. pilot certificates and process 450,000 medical certification applications each year.

Q: I am an instrument rated private pilot. I have type II diabetes mellitus. I have a special issuance Third Class medical certificate now. I would like to know if I would qualify to obtain a commercial pilot certificate. I have no other health issues.

A: Type II diabetes mellitus usually implies that a person is taking an oral medication to control the blood sugar levels. If this is so, then the FAA does allow a person who is being treated with what we physicians call an oral hypoglycemic agent to be granted a waiver for any class of medical. The requirements for the waiver are the same as you have been providing for your third class. If, however, you are being treated with any type of insulin for your diabetes, the FAA only grants a waiver for private pilot or third class.

Q: I am thinking about elective corrective vision surgery. How does this affect my medical certificate? Does it matter which form of surgery is used?

A: There are several different "corrective vision-type" surgical procedures. I am going to make an educated guess that you are considering surgery to correct for refractive errors of your eye. These are surgical procedures to reshape the cornea of the eye, with the ultimate goal of not having to wear eye glasses. The FAA does grant medical certification to airmen with these procedures. A list of the approved surgeries and our policy guidance can be found at the following URL address: *www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/et/31-34/rp/*

The pilot is grounded until the procedure has been performed, and the pilot cannot return to flying until he or she meets the vision standards for the class of medical certificate required. Also, note that some types of procedures have a mandatory period of grounding that can last from 3 to 6 months. You need to search the Aeromedical Certification portion of the Online Guide for Aviation Medical Examiners (*www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/*) for the other corrective surgical procedures.

You should also be aware that these procedures can result in complications (e.g., varying vision acuity, glare, and haloes) that could result in your losing your medical certification.

Q: I have been diagnosed with epilepsy (grand mal or clonic-tonic). My last episode was in August 1992. What obstacles would I face if I pursued a pilot's license?

A: The FAA's policy for epilepsy is that you must be seizure-free for ten years and off all anti-seizure medications for three consecutive years. You will need to provide us with a good report that relates your entire history of epilepsy. It should include a description of the seizure, the treatments you were given, exactly when the last seizure you had occurred, the date when the medication was discontinued, and a current sleep-deprived EEG. We may request other evaluations and testing depending on your history.

Send your question to SafetyBriefing@faa.gov. We'll forward it to Dr. Silberman without your name and publish the answer in an upcoming issue.

Warren S. Silberman, D.O., M.P.H., manager of FAA's Aerospace Medical Certification Division, joined FAA in 1997 after a career in the U.S. Army Medical Corps. Dr. Silberman is Board Certified in Internal Medical and Preventive/Aerospace Medicine. A private pilot with instrument and multi-engine ratings, he holds a third-class medical certificate.

The Compleat Aviator

SUSAN PARSON

An anonymous quote from the earlier days of aviation describes aviation safety — indeed, survival — as a process in which:

> *You start with a bag full of luck and an empty bag of experience. The trick is to fill the bag of experience before you empty the bag of luck.*

I suspect that most pilots would like to depend on more than luck, so let me substitute "opportunity" for "luck" and reframe the idea to say that "the trick is to use what's in the bag of *opportunity* to fill the bag of experience." Happily, the range of opportunities you have to become a more experienced and "compleat" 21st century aviator is almost boundless. Let's look at a few.

New Certificate

The basic document that the FAA issues to a pilot or instructor is a certificate, which attests to successful completion of established standards and requirements to practice in a given field.

Earning a new pilot or instructor certificate is the most obvious opportunity to add to your base of aviation knowledge, skill, and experience. If you hold a sport or recreational pilot certificate, you are already well on the way to meeting the aeronautical knowledge and experience requirements for a private pilot certificate.

From there, why not consider training for a commercial pilot certificate? As Doug Stewart's article on page 15 observes, the maneuvers required for a commercial pilot certificate will make you a more proficient pilot even if you have no interest in flying for hire. And did I mention that commercial maneuvers like chandelles, lazy eights, and eights-on-pylons are also a lot of fun? Even though it can be very challenging to perform these maneuvers correctly (just ask my instructor about my early attempts to master the lazy eight!), many pilots find that the commercial certificate is the one they most enjoy earning.

If you hold a commercial certificate, think about working toward the next level, airline transport pilot (ATP). I sometimes describe the ATP to my non-pilot friends as aviation's Ph.D. As with the commercial certificate,

Photo by Tom Kaufmann

Editor's Note: If you have ever seen Izaak Walton's "Compleat Angler," you'll recognize the spelling in the title and text of this article as an archaic version of "complete" that is often used in handbooks. It conveys our point a bit more clearly and colorfully than the conventional spelling, so please don't blame our copy editors for missing it.

you need not be aiming for an airline career to train for an ATP certificate. If you set it as a goal, though, the knowledge, skill, and experience you gain from the effort to attain it will undoubtedly make you a more well-rounded, or "compleat," aviator.

New Rating

Another way to advance your aeronautical knowledge and skills is to train for a new rating on your pilot certificate. A rating is a statement that, as part of a certificate, sets forth special conditions, privileges, or limitations. In other words, ratings specify what, and/or how, the pilot is qualified to fly, and they come in several varieties.

The most common form is the aircraft category and class rating that you see on your pilot certificate. For example, a typical rating on a private pilot certificate is "airplane single-engine land." If you decide that you want to fly twin-engine airplanes, you need to complete the training and testing requirements for a multiengine rating. Your private pilot certificate will then have ratings for "airplane single and multiengine land." As Tom Hoffmann's article on page 12 describes, you can also learn a great deal from a glider rating. That one is still on my list, along with the seaplane rating that I hope to add in connection with a future trip to Sun 'n Fun.

Ratings are also added to a certificate when the pilot qualifies for a certain operating privilege, such as an instrument rating, in a specific aircraft category and class. Although the time and effort required to earn an instrument rating is very similar to that required to attain a private pilot certificate, it is well worth achieving. First, training for an instrument rating will sharpen your basic flying skills because it demands a greater level of precision and discipline. Second, it will open up a much wider range of flying possibilities that are completely closed to a VFR-only pilot. Last, but certainly not least, an instrument rating can enhance your safety.

The knowledge, skill, and experience you gain from the effort to attain a new aviation qualification will make you a more well-rounded aviator.

New Endorsement

Still another opportunity to fill your bag of aviation experience is to earn a new endorsement. An endorsement attests to the completion of ground and/or flight training required for specific operating privileges, for airman certification testing, or for recurrent training such as flight review or instrument proficiency check. Except for certain endorsements made in pen and ink on a student pilot certificate, endorsements are generally made in the pilot's logbook.

The range of possible endorsements is as wide as the world of aviation. Just a few that you might consider adding include spins, high performance, high altitude, complex, and tailwheel. Of these, I had the most fun – and learned the most about basic flying – from earning my tailwheel endorsement in a *Citabria* several years back. The tailwheel endorsement training also provided my first opportunity to operate on grass.

***Learn* something and *earn* something on every flight.**

Photo by Tom Hoffmann

You could try a tailwheel or high performance endorsement, or perhaps both in an aircraft like the T-6 Texan pictured here.

With any certificate, rating, or endorsement, don't be intimidated by the magnitude of the challenge. Having earned all of my certificates, ratings, and endorsements in my spare time on weekends and holidays, I can well relate to how daunting it can be to embark on such a project. Just as the proverbial 1,000 mile journey begins with a single step, though, the minimum aeronautical experience requirement for a new aviation qualification begins with the first tenth that clicks over on the Hobbs meter. Here are a few suggestions for mentally managing the process and your progress.

A new aviation challenge could be just the ticket to making you a more "compleat" aviator.

- **Learn *something on every flight.*** Your instructor or flight school should have a syllabus for training. Use it to determine what knowledge and skill you should expect to acquire on each flight, and focus on wringing the maximum amount of learning and experience you can get from every hour you fly. Although there are times when the repetition of skill-based maneuvers is the most effective way to learn, scenario-based training that provides a real-world training experience (e.g., taking your family on a vacation trip) can significantly enhance your learning opportunities.
- **Earn *something on every flight.*** The aeronautical knowledge and experience requirements for each certificate, rating and endorsement are clearly set out in 14 CFR part 61. Try to ensure that each flight provides some element that takes you closer to your goal.
- ***Track your progress.*** When I was building time for my ATP certificate, I made a simple Excel spreadsheet with the various experience requirements (e.g., cross-country, night) in one column and my accumulated time for each category in others. I created a formula to update my progress after each flight. It was both satisfying and encouraging to watch the way each flight subtracted from the "time still needed" columns and added to one of the "hours accumulated" columns.

New Challenge

Not every opportunity to add experience requires a certificate, rating, or endorsement. A new

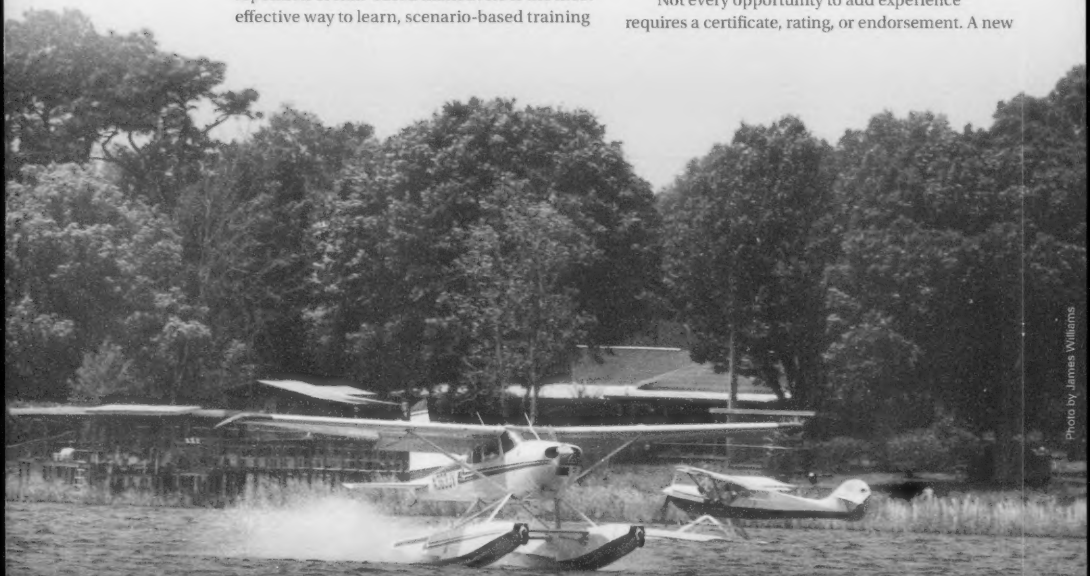


Photo by James Williams

A seaplane rating could help you improve your skills.

aviation challenge could be just the ticket to making you a more "compleat" aviator. The opportunities in the new challenge category are nearly boundless, but here are a few possibilities:

- ***Glass cockpit familiarization training.*** Though many pilots these days start and finish their training in glass cockpit aircraft, this technology may still be unfamiliar to others. Even if you plan to fly your favorite round-dial airplane forever, you might find it both interesting and useful to sample from the glass cockpit menu. If you are instrument-rated, hire an instructor to show you the basics of an RNAV(GPS) approach to LPV minimums.
- ***Specialized training.*** I have previously written about my (highly addictive) experience with formation flight training ("Up Close and Personal" in the SepOct 2009 issue of *FAA Aviation News*). I also learned a great deal from taking several courses in upset and unusual attitude recovery. Aerobatic training is still on my personal "compleat" aviator's to-do list.
- ***Cross-country trip.*** No, I mean a real cross-country trip, the kind that takes you from shore-to-shore. A Cessna T206 trip to Arizona and back with flying friends in 2009 still ranks as one of the greatest and best opportunities I have ever had for aviation learning and experience.

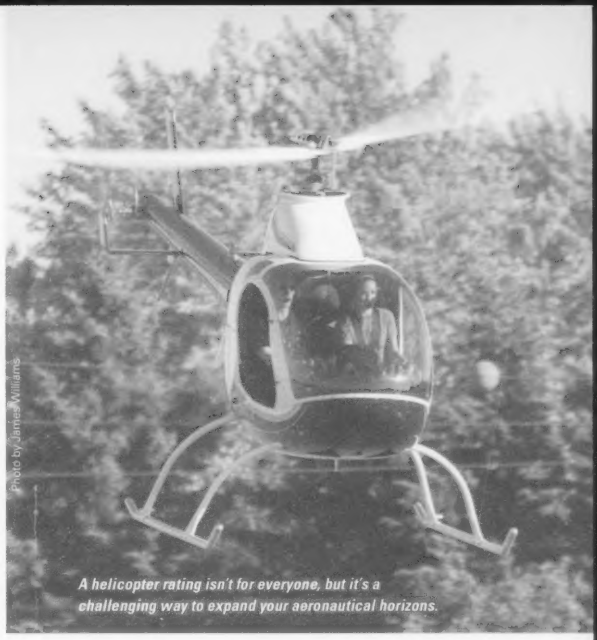


Photo by Jamie Williams

A helicopter rating isn't for everyone, but it's a challenging way to expand your aeronautical horizons.

Bottom line: When it comes to opportunities to add experience and become a more compleat aviator, the sky is the limit.

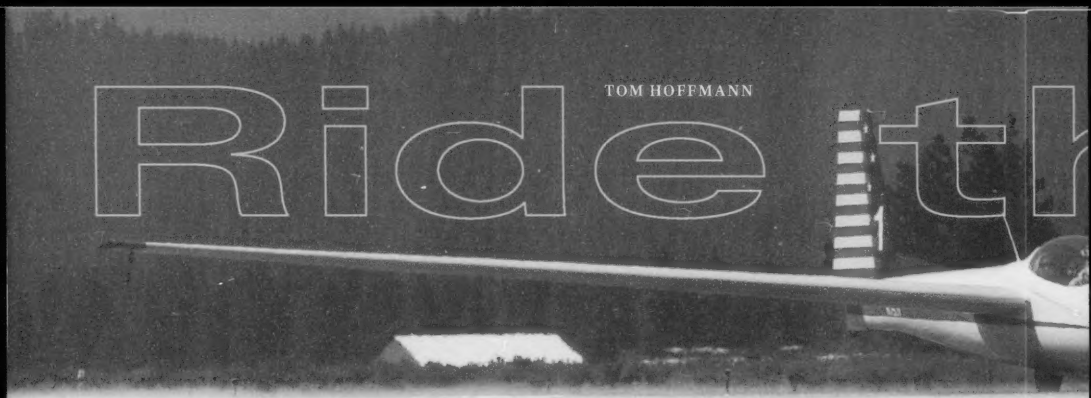
Susan Parson is a Special Assistant in the FAA's Flight Standards Service and editor of FAA Safety Briefing. She is an active general aviation pilot and flight instructor.

Certificates, Ratings, Endorsements

Certificates: The basic document that the FAA issues to a pilot is a certificate. There are several different levels of pilot certification, depending on the extent of training and testing required. These include student, sport, recreational, private, commercial, and airline transport pilot (ATP). The FAA also issues instructor certificates, such as flight instructor and ground instructor.

Ratings: Except for student and sport pilot certificates, all pilot and instructor certificates have associated ratings that specify what, and/or how, the pilot is qualified to fly. The most common form is the aircraft category and class rating, with the typical rating on a private pilot certificate being "airplane single-engine land." An aircraft specific type rating is required to act as pilot-in-command of any aircraft that is more than 12,500 pounds maximum gross takeoff weight or of any turbojet. Ratings are also added to a certificate when the pilot qualifies for a certain operating privilege, such as an instrument rating.

Endorsements: An endorsement attests to the completion of ground and/or flight training required for specific operating privileges or for airman certification testing. Endorsements are used to provide operating privileges and limitations to student pilots since they do not yet have an aircraft category and class rating; to attest to an applicant's preparation for an airman knowledge test or practical test; to certify completion of recurrent training requirements such as a flight review or instrument proficiency check; and to attest to completion of training and experience for certain aircraft characteristics (e.g., tailwheel, high performance, complex, high altitude).



TOM HOFFMANN

Ride th

Gliding Your Way to

Signaled by the subtle snap of the towrope release and the immediate plunge into airborne silence, the transition from powered to unpowered flight in a glider might at first seem unnerving and unnatural to some pilots. Yet, that initial fear is often quickly replaced by feelings of sheer exhilaration and an unparalleled sense of freedom as you experience what many consider flying in its purest sense.

Relying solely on a combination of calculated control inputs, and a keen sense of weather and situational awareness, the art of gliding—or soaring—demands a great deal of precision and skill. Once you acquire the knack for it however, gliding can be an immensely enjoyable and often addictive endeavor. And for a powered pilot, learning the basics of gliding can be both a humbling and educational process that can literally take your flight proficiency to a whole new level.

Can I Get a Lift?

Among the first true airmen, Otto Lilienthal flew in what was considered the first successful glider flight 12 years before the Wright Brothers' historic powered flight. Lilienthal, with his various avian-inspired gliders, recorded more than 2,000 flights, reaching as far as a quarter mile and a height of 75 feet in his homeland of Germany, earning him the title of "Glider King." Although much different from the appearance of modern day gliders, the basic aerodynamic elements Lilienthal incorporated in his early designs did help influence the future of manned flight.

At first glance, the most striking and yet fundamental design characteristic of a modern glider (besides the fact that many power pilots won't miss the chance to point out it's missing an engine) is its enormous wingspan. Without an engine, the wing must act as the driving force to counteract the effects of gravity on a glider. And while the wings can't produce power per se, they do generate a copious amount of lift that can keep a glider safely aloft for hours at a time.

Much of that lift can be attributed to the wing's high aspect ratio, a value calculated by dividing the wingspan by the average wing chord (or wing length). For some larger wingspan gliders, that ratio can often reach 40:1. The high aspect ratio wings found on gliders are extremely efficient and produce a comparably high amount of lift at low angles of attack with less induced drag.

On a String and a Prayer

With that increased wing size though, there is a tradeoff—the likelihood of slipping or skidding turns caused by adverse yaw is much greater. Power pilots who sometimes overlook the need for well-coordinated climb-outs or turns might be in for a surprise the first time controlling a glider. Part of that surprise might also be caused by not finding an inclinometer on the panel. Instead, many gliders use a yaw string, which is simply a three to five inch piece of yarn attached to the outside of the canopy in the free airstream. Unlike using an inclinometer, when the tail of the string moves left, pilots will need to add right rudder to stay coordinated in a turn.

Other items on a glider that might seem out of the ordinary to an average GA power pilot include high drag devices like spoilers and dive brakes, which are generally reserved for controlling the sink rate during the landing phase. A spoiler, as its name implies, interrupts airflow on the upper surface of the wing to enable a glider to descend more rapidly using the increased drag. Dive brakes extend from both the upper and lower surfaces of the wing to help increase drag. Keep in mind that the cockpit location of spoiler or dive brakes control,

Photo by H Dean Chamberlain

Greater Pilot Proficiency

traditionally to the left of the pilot, presents another difference for power pilots who might be used to using their right hand to help control sink rate with the throttle.

And along with the airspeed indicator, altimeter, and magnetic compass found on most glider cockpit panels, you'll find another instrument extremely valuable to glider pilots: the variometer or "vario". Like the vertical speed indicator in an airplane but with a smaller rate scale, the vario indicates the rate of climb or descent in feet per minute or meters per second. Varios are also usually accompanied by short audio beeps which change in pitch and speed depending on the vertical speed and direction (higher pitch and faster equals going up). This helps glider pilots know when they hit the core of the rising air such as in a thermal, and conversely, when they need to find another area of rising air.

A Bird's Eye View

So by now you're probably now asking yourself - how can learning how to fly an engine-less sailplane with a 60-foot wingspan make me a better (power) pilot? You might even think soaring is just for the birds, literally. True, powerless flight is the natural domain for birds, but that doesn't mean we can't learn from our avian friends. With practice, you too can master the delicate balance between atmosphere and terrain and learn to safely leverage the many intricate interactions between them to your advantage.

In his book *Flying Conditions: Micrometeorology for Pilots*, author Dennis Pagen describes how glider pilots must be able to "see" the air in order to maximize performance and avoid dangers. Part of this special sensory skill, says Pagen, involves the ability for glider pilots to seek out and utilize the unseen forces of natural lift, such as thermals, mountain ridges, or frontal boundaries. This skill also demands an understanding of how different atmospheric conditions (e.g., lapse rates, wind direction, humidity) can affect these areas of lift and possibly require you to change your plans mid-flight. By no means is this skill instinctive; plenty of study and practice is required. In the end, fine-tuning these micrometeorology skills can make you a safer and more proficient pilot—glider or powered.

Photo by James Williams

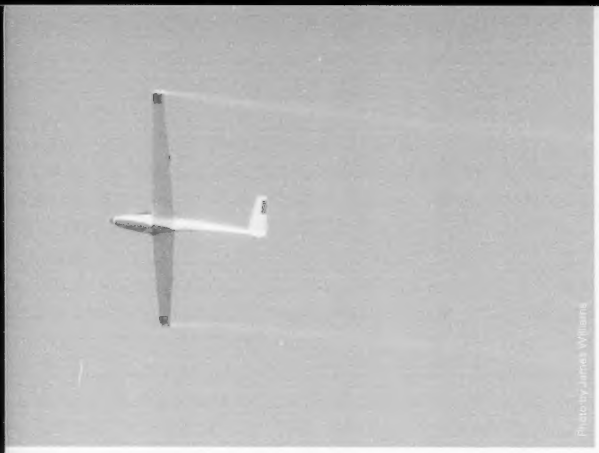


Photo by James Williams

Speed is King

In addition to knowing where to find areas of good lift, glider pilots must also be astutely aware of airspeed at all times. For power pilots, an engine failure normally triggers an almost involuntary response of trimming for best glide speed, or $V_{L/D}$. Sure, that will usually get you the biggest horizontal bang for your buck, but maybe giving yourself more time to restart or prepare is more important when an airport is well within landing distance. In that case, using what glider pilots refer to as minimum-sink speed, you'll lose less altitude over a given period of time.

Another airspeed critical to glider pilots is the speed-to-fly, which refers to the optimum airspeed for flying between areas of lift for a given glider. Essentially, it's a matter of speeding up to expedite an exit from areas of sink while slowing down in lift to maximize the altitude gain. These speeds can be calculated with a chart (such as the airspeed/sink rate graph chart for the glider), or with readings from a variometer with speed-to-fly markings or electronic flight computer. A speed-to-fly may not be listed in your powered aircraft's POH, but understanding the concept is a good way to exercise your knowledge of flight dynamics.

Manager Experience Needed

Without an engine, you might think there's less to worry about in a glider. No carb heat to apply, no oil pressure gauges to watch, and no dipping tanks before a flight. While the cockpit (and checklists) might seem a little leaner than what you're used to, don't be misled into thinking there's any less work to do. On the contrary, you're using less to do the same, if not more.

"It's all about task management," says FAA Aviation Safety Inspector Lance Nuckolls. "With a glider, things tend to change more rapidly demanding a razor sharp focus on where you are and what you are doing at all times. You have to divide your focus on several things at once, but also know how to divert that focus on one task when needed—such as dealing with a low altitude rope/cable break during an aerotow or winch launch."

As an active glider instructor, Nuckolls also teaches his students about the importance of energy management and situational awareness, which is especially important during landing. "You don't stall a glider on to the ground like you would in many small GA airplanes. You roll it on the runway with the nose up just enough to have minimum energy to land."

Due to the range limitations of a non-powered glider, pilots must also always be on the lookout for a suitable place to land should the weather turn or something malfunctions. This increased situational awareness of the terrain around you can serve as an excellent safety habit, and one which can be easily carried over to your next powered flight.

"It's a feel," says Nuckolls. "A sight picture you acquire with time and practice that can help any pilot."

It's A Soar Subject

Flying a glider means different things to different people. Some see it as a way to escape and become one with nature. Others may see it as a competitive challenge against gravity—seeing how high they can go, hopping from thermal to thermal. It is what you make of it and what you put into it. Whether you aspire to have a glider rating and perhaps a sailplane of your own, or if you just want to enjoy the sensation of soaring, you'll soon realize why gliding is one of the most rewarding and educational experiences aviation has to offer. Soar safely!

Tom Hoffmann is associate editor of FAA Safety Briefing. He is a commercial pilot and holds an A&P certificate.

For More Information

Soaring Society of America
www.ssa.org

AC-00-6 – Aviation Weather, Chapter 16
www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2000-6A%20Chap%2016-Index.pdf

Glider Flying Handbook
www.faa.gov/library/manuals/aircraft/glider_handbook/media/faa-h-8083-13.pdf

DOUG STEWART

INTERESTING WAYS *to* Bore Holes *in the* Sky

The pilot in the left seat looked both ways to clear the area and then started a gradual climbing turn in the direction of the 45-degree reference point he had already selected. I was pleased to see that he had planned, and now controlled, the climbing turn so as to reach the maximum pitch-up attitude at the 45-degree point. The rate he used to roll into the bank was just what he needed to prevent the rate of turn from becoming too rapid. As too many pilots learn the hard way when attempting this maneuver, anything but the proper (slow) rate of roll will cause the rate of turn to be too rapid, and the nose of the airplane will reach the 45-degree reference point before it attains the highest pitch attitude.

At the 45-degree point, the pitch attitude was at maximum and the angle of bank continued to increase, but now the pilot also started to slowly decrease the pitch attitude toward the horizon and the preselected 90-degree reference point. Since the airspeed was still decreasing, he applied right rudder pressure to counteract torque. As he lowered the airplane's nose toward the 90-degree reference point, the bank continued to increase, and he used the merest touch of opposite aileron to prevent the bank from becoming too steep. When the airplane completed 90 degrees of the turn, the bank was at the maximum angle (approximately 30 degrees), the airspeed was at the minimum (5 to 10 knots above stall speed), and the airplane pitch attitude was passing through level flight.

I watched as the pilot continued to fly the airplane into a descending turn, so that the airplane's nose traced an imaginary loop below the horizon the same size as it had just flown above. As the pilot's reference line passed through the 90-degree point, he gradually decreased the bank and allowed the airplane's nose to continue lowering. When the airplane had turned 135 degrees, the nose was at its lowest pitch attitude. Since the airspeed was increasing during this descending turn, he compensated by gradually relaxing rudder and aileron pressure. Simultaneously, he raised the nose and rolled the wings level. He noted the amount of turn remaining and adjusted the rate of rollout and pitch change so that the wings became level and the

These maneuvers will make you a more proficient pilot as you take the airplane through a wide range of airspeeds and altitudes.

Photo by H Dean Chamberlain

original airspeed was attained in level flight just as the 180-degree point was reached. Upon reaching the starting altitude and the 180-degree point, he immediately started a climbing turn in the opposite direction toward the selected reference points, and completed the second half of the eight in the same manner as the first half.

I had just witnessed one of the best lazy eights I have ever seen.

A "Lazy" Eight Requires a Working Pilot

The lazy eight is one of the performance maneuvers required for the commercial pilot certificate. Notwithstanding the name, this maneuver makes the pilot work to master it, and most pilots need at least several attempts before it begins to make sense. One of the big keys to understanding the lazy eight is learning to visualize exactly where you need to be at every point in its execution; that is, where you need to be in terms of pitch, bank, airspeed, coordination, and the chosen reference point.

Along with chandelles, eights-on-pylons, and steep turns, the lazy eight is one of the maneuvers that make the commercial pilot certificate one of the most fun to obtain. Yet, why wait until you're working on the certificate to learn it? These maneuvers are a lot of fun to fly. More importantly, they will help make you a more proficient pilot because they require you to learn about energy management, about how the effectiveness of flight controls changes with airspeed, and about precise coordination of controls through a wide range of airspeeds and altitudes.

If you're up for a real challenge, nothing increases pilot proficiency more than aerobatic flying.

As a training and proficiency maneuver, the lazy eight has particularly high value because it requires constant variation of forces and attitudes. Indeed, it is the only standard flight training maneuver during which the forces on the controls are never constant. As such, it helps the pilot develop subconscious feel, planning, orientation, coordination, and speed sense. It is not possible to do a lazy eight mechanically, because the control pressures required for perfect coordination are never exactly the same.

Performance Requires Proficiency

Like the lazy eight, chandelles and eights-on-pylons are performance maneuvers that require maximum pilot proficiency. That's the point of these maneuvers, as you aren't likely to need them during your typical cross-country flight from Airport A to Airport B. Let's take a look at what they require and at how they demand the most in pilot proficiency.

Done properly, the chandelle is as elegant as its name. It is a maximum-performance climbing, 180-degree turn that starts with rolling into a 30-degree banked turn, adding power as needed and pitching up. In a correct chandelle, you reach the maximum pitch attitude at the 90-degree point of the turn, and maintain that pitch through completion of the turn. If you haven't pitched up enough, you won't get high or slow enough by the end of the maneuver. On the other hand, if you have pitched too steeply, you'll stall before completing the turn.

In the second half of the chandelle, you slowly roll out, timing this process to finish the turn just as you reach the 180-degree point. If you don't roll slowly and continuously, you might very well have to increase the roll rate at the very end of the turn. On the other hand, if you decrease the roll rate too quickly you will fail to complete the full turn.

It's not hard to see that a successful chandelle requires a great deal of pilot judgment, situational awareness, control finesse, and overall proficiency.

You can also increase your proficiency as a pilot by learning to fly eights-on-pylons. This maneuver requires understanding of a concept called "pivotal altitude," which, in turn, demands the same blend of coordination and division of attention you need for the other maximum-performance maneuvers. In a nutshell, this one is a ground-reference maneuver that requires circling about a "pylon," keeping a reference point on the wing pointed at the pylon, then breaking off the turn and flying a straight line for a short distance to a point where you enter a turn in the opposite direction around another pylon.

Groundspeed determines the pivotal altitude, which is the specific altitude required to keep the reference point on your wing pointed to the reference on the ground. If there is a tailwind, you will have to climb as your groundspeed increases. Conversely, you will have to descend with a headwind.

Situational awareness is obviously important, but so is basic aircraft control. One of the challenges is to not cheat with your feet, that is, do not try to use rudder to keep the wing on the pylon. This maneuver is to be flown with coordinated controls. One easy way to think about it is that if the pylon is moving behind the wing reference you will need to increase

back pressure. If the pylon is moving forward, i.e., as you turn into a headwind, push forward on the yoke.

Really Unusual Attitudes

If you're up for a real challenge, nothing increases pilot proficiency more than aerobatic flying. It is a challenge to fly around all three axes of flight with enough situational awareness to know which way is up. Gaining precision in these maneuvers offers a wonderful sense of accomplishment. It also makes you a better pilot.

In addition to the fun factor and proficiency points, there is another important reason for every pilot to consider at least some basic aerobatic training. Even if you are the sort of pilot who dislikes banks in excess of 30 degrees, or if you never pitch up or down beyond 10 degrees, there might very well come a time in your flying when the blue side is down, not up. And, it probably didn't get there because of something you did on purpose.

I speak from experience. Awhile back, I took initial *Malibu/Mirage* training. It was the last day of training; I thought I knew what was what. The simulator I was "flying" was not a motion device, but it did include a full cockpit mockup with projection on a screen that wrapped around outside the cockpit windows. The instructor asked me to close my eyes so we could do unusual-attitude recoveries. I dutifully complied and waited for instructions to open my eyes and recover from whatever attitude I found myself in. I admit to being slightly smug, because I wondered how the instructor could possibly disorient me in a non-moving bolted-to-the-floor flight-training device. When the instructor told me to open my eyes and recover, I had a, "You've got to be kidding me" reaction. The blue side was down. The airspeed was trending up. Even though I wasn't hanging from the shoulder straps, this simulated *Mirage* was inverted.

How would I recover? Would I pull back on the yoke? That would result in a split-S, a maneuver that pulls from inverted through the second half of a loop. Or, would I add forward pressure to the yoke and then roll back to straight and level?

The school had added this exercise to the syllabus precisely because too many pilots responded to this kind of upset—and, sadly, too often in a real airplane after encountering wake turbulence—by performing a split-S only to become much more upset when the wings departed the aircraft as a result of reaching speeds well in excess of V_{NE}. A pilot who has the benefit of aerobatic training, however, would be more likely to overcome the "pull" instinct and know that the roll is the safest way to recover from this kind of upset.

Overcoming the natural instincts that can be killer instincts in an airplane is one of the greatest single proficiency benefits to aerobatic training. The only safe way that pilots can gain the sometimes counter-intuitive skills needed to recover from these kinds of upsets is through basic aerobatic, or upset recovery, training. Will you experience some motion sickness during the training? Possibly. Is your adrenalin valve going to be wide open? You betcha! Yet, even if you only receive one hour of aerobatic training, you will be much better prepared to recover from an upset if it ever happens to you. You will know how to get the blue side back on top if you ever find it down. And, you will be taking yet another step in the transition from good pilot to great pilot—and a proficient one.

Overcoming the natural instincts that can be killer instincts in an airplane is one of the greatest single proficiency benefits to aerobatic training.

Doug Stewart is the 2004 National CFI of the Year, a Master CFI, and a DPE. He operates DSFI, Inc (www.dsflight.com) based at the Columbia County Airport (1B1). He also serves as chairman of the Society for Aviation and Flight Educators (SAFE).

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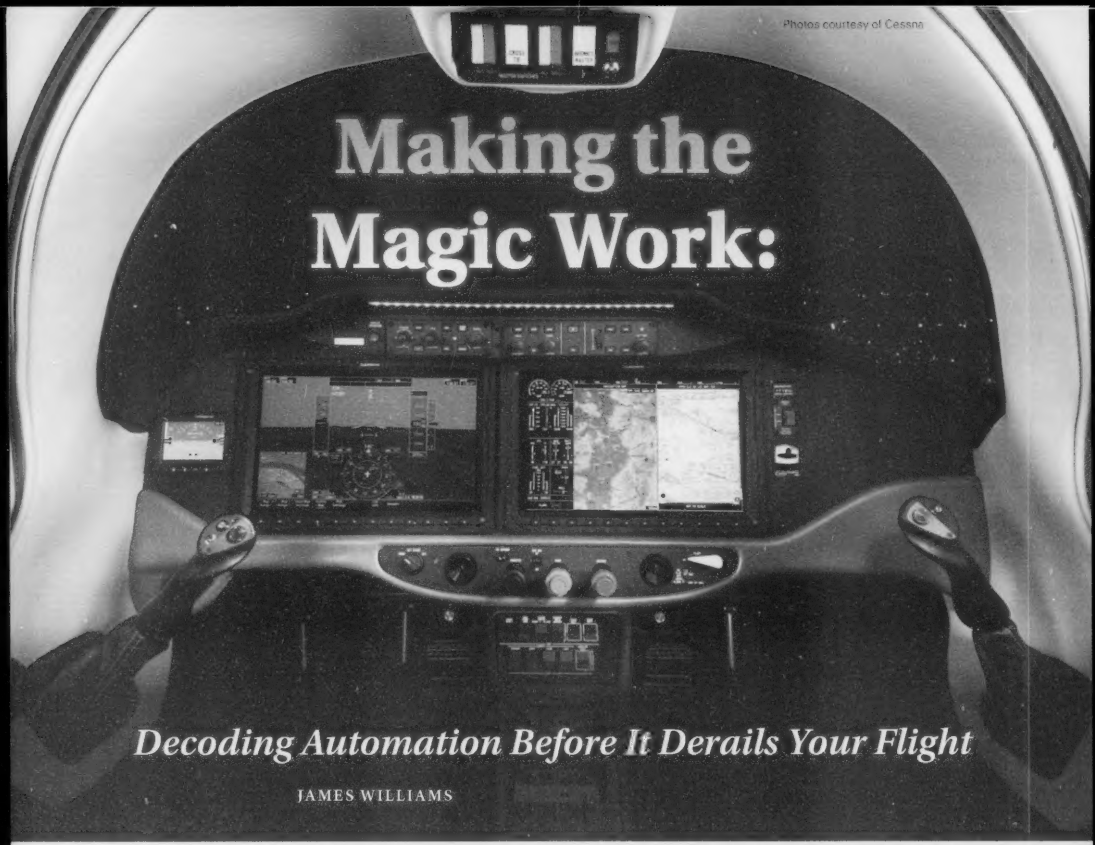
Photo by H. Dean Cochran



Photos courtesy of Cessna

Making the Magic Work:

Decoding Automation Before It Derails Your Flight

JAMES WILLIAMS

I proudly admit to being a technophile. I've been using computers since I can remember, and possibly longer according to photographic evidence. I have at least six computers in my home, along with smart phones, media consoles, set top boxes, GPSs, iPods, etc. But despite my technical expertise, I'm still routinely flummoxed by automation. I know I'm not alone in thinking: "Why did that just do that?!" With more advanced systems and high levels of automation rapidly moving into general aviation (GA) aircraft, now is the time to figure out your automation management strategies. So here are a few pointers I've found useful.

To keep your brain engaged, use verbal callouts anytime you make a change to airspeed, altitude, heading, frequency, or automation mode.

Monitor the Magic

At some point in your aviation career, whether you fly for a living or for pleasure, you've probably heard about Eastern Airlines flight 401. Late on the night of December 29, 1972, the flight missed an approach at Miami International Airport following a failure of the nose gear position indicator light. While attempting to trouble shoot the problem, the crew failed to notice the aircraft was slowly descending into the Everglades. The National Transportation Safety Board (NTSB) concluded that the flight crew failed to monitor the flight instruments and detect the unexpected descent in time to prevent the accident.

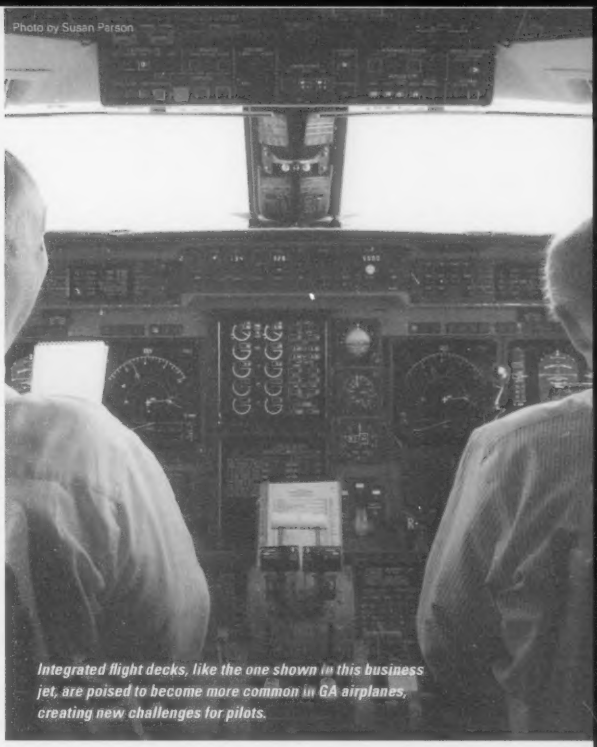
Despite having a full crew of three properly qualified pilots (captain, first officer, and second officer) and a maintenance specialist in the jumpseat, no one was monitoring the airplane's flight path. Instead, everyone on the flight deck became completely consumed with what turned out to be a burnt-out bulb. They all assumed that the autopilot would hold the assigned altitude of 2,000 MSL, and no one noticed the autopilot disconnect or the radar altimeter warnings until it was too late.

This is a classic case of failure to monitor the automation. Even the best systems have their faults, and it's never a good idea to trust them completely. Your life may be at stake, so keep your scan going even when the autopilot is engaged. Be vigilant about what automation modes are in use (e.g., NAV/Heading/VNAV, etc.). To keep your brain engaged, use verbal callouts anytime you make a change to airspeed, altitude, heading, frequency, or automation mode. You might also consider making callouts when you cross each waypoint along your route.

Know the Systems

The NTSB report observes that there were many factors at play in the fatal Colgan 3407 accident in 2009. One such factor was the crew apparently forgetting about activating a system and how that system worked with other aircraft systems. Early in the flight they turned on the anti-icing systems which included selecting a switch which increased reference speeds. This increases the margin over a stall to give the crew some compensation for any potential aerodynamic losses caused by the potential icing. The crew discussed their experience with icing and noted observing icing on the airframe but did not indicate any real concern (the NTSB agreed, concluding that icing did not adversely affect the handling characteristics of the accident flight). But when the first officer set performance data for landing, she did not include that the Vref increase system was active. This error created a conflict between how the aircraft was operating and the information the systems had provided regarding the reference speed to be flown on approach: The system recommended a speed of 118 KIAS when, with the Vref increase system on, it should have been 138 KIAS. The other solution would have been to turn the system off, which would have removed the conflict between the aircraft's systems and the crew's expectations

As the captain slowed the aircraft for approach at 118 KIAS, the aircraft's stick shaker activated at 131 KIAS. The surprised captain pulled back on the yoke while adding power. This action increased the g-load, which in turn increased the stall speed. As the airspeed decreased through 125 KIAS, the aircraft exceeded its critical angle of attack (AOA) and stalled. Even after the stick pusher twice activated in an attempt to break the stall, the captain continued to pull back in response. Multiple crew misunderstandings about the information and system interaction played a role in the outcome.



Integrated flight decks, like the one shown in this business jet, are poised to become more common in GA airplanes, creating new challenges for pilots.

While most GA aircraft systems are less sophisticated, we still have interdependent systems. Moreover, interdependent avionics will become more common. Radios are tied to displays, which are tied to course deviation indicators (CDIs) and moving maps. The point is that you need to know how each of those systems interacts with the others, and where there might be potential pitfalls.

Know how each system interacts with others, and where there might be potential pitfalls.

Be Ready for Malfunctions

While automation can help reduce workload, pilots must be prepared in case it suddenly disappears. In 2005, a Cirrus SR-22 crashed following apparent pilot disorientation. According to the NTSB, the pilot was instrument rated and had more than 400 hours in type. However, he had only 15 hours of actual instrument experience. He became disoriented after his Primary Flight Display (PFD) failed.

An instructor who previously flew with the pilot stated that they had practiced partial panel flying less than a month before the accident, in addition to a number of previous partial panel practice sessions. Clearly, therefore, the accident pilot had considered

the chance that his PFD could fail; in fact it had malfunctioned in the past. But, as you might imagine, there is a world of difference between practicing in a situation where you are prepared for the failure and seeing your workload dramatically and unexpectedly increase in actual instrument conditions. That alone is a good reason to make training as realistic as reasonably possible. And, as always, have a reliable and workable contingency plan.

These are three good starting points for how to manage not only the magic (aka automation) in the cockpit, but also your overall flying in a safe and professional manner.

What tips do you have?

James Williams is FAA Safety Briefing*'s assistant editor and photo editor. He is also a pilot and ground instructor.*

Better than Real

HARLAN GRAY SPARROW III

You may have heard it is possible for a pilot to earn a type rating without ever having been in the real airplane. This is possible – and safe – because simulation technology these days is as real as it gets. In fact, simulators make it possible to conduct even more extensive training, because it is possible for the pilot in a simulator to experience realistic failures and malfunctions that would not be safe to simulate (much less perform) in the real airplane.

As you might imagine, someone in the FAA has to decide whether a simulator is sufficiently realistic to substitute for the actual airplane and meet training requirements. That "someone" is a group of people comprising the National Simulator Program (NSP), which is organizationally part of the Flight Standards Service's Air Transportation Division. Established at FAA Headquarters in 1980, the NSP began with a staff of 12 and had regulatory oversight responsibility over 92 simulators, both visual and non-visual. Since 1982, the NSP has been physically located in Atlanta, Georgia.

The NSP is charged with evaluating and qualifying over 760 flight simulators, numerous flight training devices (FTDs), and recommending them for approval for use in FAA-approved flight training curricula. It is through the efforts of the NSP that qualified flight simulators are available for approval and subsequent use in the training of airline crewmembers, commercial and private operators, and FAA inspectors.

From apple carts to modern full fidelity simulators, we've come a long way in flight simulation.

The policies and procedures established by the NSP focus on evaluating the performance of the simulator in comparison to the performance of the aircraft, both objectively and subjectively. Any comparison other than simulator-to-aircraft introduces the possibility of comparison errors and requires detailed evaluation by the NSP's technical staff in accordance with the applicable regulations.

The NSP is also responsible for setting criteria and standards (as defined in Title 14 Code of Federal Regulations [14 CFR] part 60) for initial qualification and recurrent evaluations for aircraft and rotorcraft simulators, as well as for level six and seven FTDs. The NSP provides initial evaluation of reference data for level four and five FTDs, if required, and provides technical assistance to the Flight Standards District Office (FSDO) with responsibility for approval of the FTDs.

In addition, the NSP designates pilot simulator evaluation specialists to serve as operations members and active participants on the Flight Standardization Boards (FSB) and the Flight Operations Evaluation Boards (FOEB) of new aircraft.

NSP inspectors and engineers travel throughout the world evaluating FAA-approved simulators and assisting foreign countries that have requested technical assistance through the U.S. State Department. Moreover, the NSP works with international organizations to improve simulation standardization worldwide. We are truly here to help.

Harlan Gray Sparrow III is the manager of the FAA's National Simulator Program. For more information, please see www.faa.gov/about/initiatives/nsp.

SUSAN PARSON

Checklist

Can I (Legally) Use My iPad?

Since acquiring my Apple iPad® last summer and stocking it with an ever-evolving suite of aviation apps, this amazing and, yes, magical device has become my favorite tool for 21st century flight planning, flight management, and flight monitoring. Every pilot who sees its capabilities seems to want one, but the first question I usually get — even before the obligatory exchange of best app tips — concerns the legalities of using iPad during flight.

Straight from the Source

For those operating under Title 14 Code of Federal Regulations (14 CFR) part 91, the single best source of information about the FAA's view of iPad use is Advisory Circular 91-78, *Use of Class 1 or Class 2 Electronic Flight Bag (EFB)*. AC 91-78 is applicable to instrument flight rules (IFR) or visual flight rules (VFR), preflight, flight, and postflight operations conducted under part 91 unless such use is prohibited by a specific section of 14 CFR chapter I. AC 91-78 provides "information for removal of paper aeronautical charts and other documentation from the cockpit through the use of either portable or installed cockpit displays (electronic flight bags)." Though its July 2007 publication date obviously preceded the iPad's introduction in 2010, the guidance still applies.

If you aren't certain about the definition of EFB, AC 91-78 can help. In brief, it defines an EFB as an electronic system that can display a range of aviation data (e.g., checklists, navigation charts, pilot's operating handbook (POH)) or perform basic calculations (e.g., performance data, fuel calculations). Physical EFBs may be portable (Class 1), attached to a mounting device (Class 2), or built into the aircraft (Class 3).

As far as the FAA is concerned, "The in-flight use of an EFB in lieu of paper reference material is the decision of the aircraft operator and the pilot in command" for part 91. This guidance applies as long as the interactive or precomposed information used for navigation or performance planning is valid, up-to-date, and functionally equivalent to the paper reference material it replaces.

Do I Need Paper Back-ups?

The FAA does not *require* you to carry paper, but AC 91-78 suggests that pilots consider a secondary source of aeronautical information. The secondary source could be a separate electronic display.

A related point is AC 91-78's recommendation for implementing an EFB. The idea is to practice with the iPad or other EFB before you leave your paper products at home. Items to evaluate include: workload management during various phases of flight, integration of the EFB into the cockpit, display and lighting, and system failures. You also need a solid grasp of the aeronautical information apps you are using. You don't want to be fumbling for the right data at a critical phase of flight.

Other considerations include power supply and signal strength. Though the iPad's battery life is excellent, intensive use over a long flight can drain the battery faster than you might expect — especially if you start with less than 100 percent. Several after-market devices are available to boost and stabilize the GPS signal reception to your iPad.

Note: Operators of large and turbine-powered multiengine and fractional ownership aircraft operating under part 91F and part 91K should reference AC 120-76, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags (EFB) *(currently under revision), for specific functionality and/or equipage guidelines.*

Learn More

AC 91-78 Use of Class 1 or Class 2 Electronic Flight Bag (EFB) – July 2007
http://rgl.faa.gov/REGULATORY_AND_GUIDANCE_LIBRARY/RGADVISORYCIRCULAR.NSF/0/eb15b0c685650a0486257321006b3b8c/$FILE/AC%2091_78.pdf

InFO 11011 – May 13, 2011 - The Apple iPad and Other Suitable Tablet Computing Devices as Electronic Flight Bags (EFB)
http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/media/2011/InFO11011.pdf

"Flying Paperless Airplanes" – FAA Safety Briefing – May June 2010

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SUSAN PARSON

Trust, *but* Verify

Airworthiness Tips for Pilots of Rental and Multi-Owner Aircraft

Trust, but verify! While President Ronald Reagan popularized this Russian proverb in a very different context, it is also excellent advice for pilots who fly rental or jointly-owned aircraft.

When it comes to owner-flown aircraft, pilots have the advantage of knowing exactly how an aircraft has been operated and maintained. With rental and jointly-owned aircraft, on the other hand, the pilot has to place a certain amount of trust in both the fellow pilots of that aircraft and its owner or operator. After all, the regulations specifically state that the owner or operator of the aircraft has primary responsibility for maintaining it in an airworthy condition (14 CFR 91.403).

However, trust in the owner or operator is not enough to satisfy the FAA or, more importantly, to meet the obligations assigned to the pilot in command (PIC). As PIC, the pilot of an aircraft is the final authority with respect to its operation (14 CFR 91.3) and thus has responsibility for determining that it is in condition for safe flight (14 CFR 91.7). Whether you own, rent from the FBO, or participate in a joint ownership arrangement, you are still obligated to verify that the aircraft you are about to fly is legally airworthy, that is, it conforms to its type design and is safe to fly.

FBOs, flight schools, and well-run flying clubs are usually wise enough to keep the aircraft's irreplaceable logbooks and maintenance records in a safe place. So, how do you meet this obligation if you do not own the aircraft or have ready access to its logbooks? Here are some tips and a few things to look for before you rent or join a partnership.

Who's in Charge?

You have probably heard the old saying about an important task involving Everyone, Someone, Anyone, and No One. Everyone was sure that Someone would do it. Anyone could have done it, but No One actually did it. The lesson: Safety is not served by confusion about who does what. Whether it is an FBO rental or a flying club aircraft, you will want to ascertain that there is a specific named organization or individual responsible for maintenance. For example, in my flying club, the bylaws set out roles and responsibilities as follows:

> *The Maintenance Officer shall be responsible for coordinating and scheduling inspections, general and preventive maintenance, major overhauls, new equipment installations by certified aircraft and powerplant mechanics, and compliance with applicable service bulletins. The Maintenance Officer shall ensure that maintenance record entries are completed and that the maintenance records are available in the aircraft.*
>
> *Notwithstanding any of the above, and as specified in the applicable regulations (14 CFR), each shareholder acting in his capacity as PIC has the final responsibility for ensuring that all required maintenance and inspections have been*

performed, that applicable and required records are in the aircraft, and that the aircraft is airworthy and in a condition for safe flight each time he flies the aircraft.

Where Are the Documents?

To accommodate the PIC's need to verify completion of required inspections and maintenance, reputable FBOs and well-run flying clubs generally make an up-to-date airworthiness and maintenance summary sheet available to everyone who flies the aircraft.

When I worked for an FBO several years ago, one of the tasks assigned to the day's designated operations manager/dispatcher was to record, track, and report this information to renter pilots. Along with the aircraft keys, each pilot received a dispatch sheet listing due dates and/or tach times for all required maintenance and inspection events (see Fig. 1 for a general reference checklist). The ops manager updated these numbers after every flight.

My flying club takes a similar approach. The organization's maintenance officer is responsible for safeguarding and maintaining the actual aircraft logbooks. He uses this information to post an up-to-date maintenance, inspection, and airworthiness summary sheet on the club's scheduling and information Web site. The club's Web site also includes current weight-and-balance information as well as tips for safe and efficient operation of the aircraft.

The club also keeps a copy of the current airworthiness and maintenance status sheet in the aircraft's Hobbs book. This book, a loose-leaf notebook that stays in the airplane, includes a number of additional items you should expect to see in any rental or jointly-owned aircraft: log sheets for aircraft usage (Hobbs sheet), VOR accuracy checks, GPS database update, fuel and oil usage, and squawks. You should also ascertain that this package includes insurance information, emergency contact data, and procedures for dealing with malfunctions that occur away from home base.

One potential 'gotcha' is worth noting. Part of the preflight inspection is using the ARROW mnemonic to verify that all required documents are aboard: Airworthiness certificate, Registration, Radio Station License (if flown outside the United States), Operating limitations, Weight and balance data. Pilots learn that operating limitations include signs and placards as well as those contained in the approved airplane flight manual (AFM). But, did you know that the operating limitations may also include information contained in the flight manual supplement for any equipment added after the airplane leaves the factory (e.g., an autopilot or an approved IFR GPS or moving map navigator)? Or, that some operating limitations stipulate that GPS and autopilot manuals must be aboard? I have sometimes found these items missing from rental and jointly-owned aircraft, so be sure to check and, as necessary, ask before you aviate.

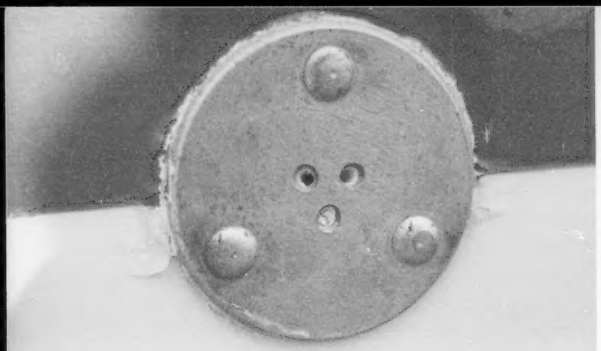
It is always good to be familiar with the aircraft's actual logbooks and to know how to find the information you need.

How Do I Know About Squawks?

The in-aircraft package provided by reputable FBOs and flying clubs includes a discrepancy log, more commonly known as the "squawk sheet." When operating a rental or jointly-owned aircraft, look for a clearly-stated procedure for dealing with

Photo by Adrian Eichhorn

A thorough preflight inspection is a necessary part of determining airworthiness of your aircraft. Be sure to inspect for—and report—any findings that may affect a safe flight.



As pilot in command, you have the responsibility for determining that your aircraft is in a condition for safe flight. A clogged static port (as pictured) can easily nullify that safety margin.

discrepancies. The governing regulation is 14 CFR 91.213(d), which addresses inoperative instruments and equipment for aircraft that do not have an approved Minimum Equipment List (MEL). Many FBOs and facilities include a checklist summary of this regulation in the aircraft's Hobbs book. For example:

- Is the affected equipment required by the aircraft's type certificate?
- Is the affected equipment listed as required on the aircraft's equipment list or Kinds of Operation Equipment List (KOEL)?
- Is the affected equipment required for the kind of operation being conducted (e.g., VFR, IFR, night)?
- Is the affected equipment required by any other regulation?
- Is the affected equipment required by an airworthiness directive?

If the answer to any of these questions is yes, then the aircraft must be grounded. If the answer to all of these questions is no, then the last step is to ensure that a qualified person removes or deactivates the affected item and marks it as inoperative. You will want to verify that the FBO or flying club you patronize has a clear method for compliance with this regulation. The FBO where I worked included this checklist in every Hobbs book, but it also had a policy of never dispatching an aircraft with open squawks.

Now that you have a few basic tips for verification, we would love to hear your ideas and most effective practices for ensuring the airworthiness of rental and jointly-owned aircraft. We will publish the best ideas in a future issue of *FAA Safety Briefing*. Send them to us at SafetyBriefing@faa.gov.

Susan Parson is a special assistant in the FAA Flight Standards Service and editor of FAA Safety Briefing. *She is an active general aviation pilot and flight instructor.*

For More Information

The May/June 2009 issue of *FAA Aviation News* focuses on the FAA's responsibility to set standards for aircraft certification and airworthiness and the important role that pilots and mechanics play in ensuring safety. You can read it at www.faa.gov/news/safety_briefing/2009/media/mayjun2009.pdf.

Required Maintenance and Inspections

	What	How Often	Reference
A	Annual inspection (includes a check of Airworthiness Directives)	Every 12 calendar months	14 CFR 91.409
V	VOR check (if used for IFR)	Every 30 days	14 CFR 91.171
1	100 hour inspection (if used to carry passengers for hire or flight instruction in an aircraft that person provides)	Every 100 hours	14 CFR 91.409
A	Altimeter & Static System test and inspection (for airplane or helicopter operated under IFR in controlled airspace)	Every 24 calendar months	14 CFR 91.411
T	Transponder test and inspection	Every 24 calendar months	14 CFR 91.413
E	ELT (emergency locator transmitter) inspection & battery currency (with some exceptions)	Every 12 calendar months (see ref. for battery replacement schedule)	14 CFR 91.207

Fig. 1

TOM HOFFMANN

Too Old to Fly?

Relieving the Aches and Pains of Aging GA Aircraft

Airplanes are a lot like the human body. Take good care of them and they usually return the favor by running at peak performance for longer than you might expect. Neglect them, and they will age before your eyes, becoming much more prone to sickness and fatigue. One glaring difference between the two however, is that humans can generally detect when something is going wrong with the body. Nagging chest pain or shortness of breath usually prompt a visit to the doctor.

An ailing airplane is generally much less forthcoming with critical precursors of imminent danger. Blinking warning lights, leaking fluids, and creaky latches are all helpful indicators of an airplane problem. Often, though, discovering an unsafe condition, particularly with an aircraft over the 40-year mark, requires a much closer look. Much like caring for an infant or pet, we have to rely on a combination of what we can see and observe, what we know from experience and data, and what we sense from old-fashioned intuition. Being adept at these measures won't make you the aviation-version of Ponce De Leon, but it can still help you give your airplane a longer and safer life.

The Gen-Xers of the GA Fleet

Whoever said 40 is the new 20 obviously wasn't referring to airplanes. In the harsh and unforgiving world of aviation, 40 years might actually be closer to 50, 60, or higher. There's no denying the aging process for aircraft, regardless of how meticulously you maintain them. And, given that 40 is now the average age for more than two-thirds of aircraft in the GA fleet, staying ahead of this aging curve has never been more important.

Photo by Kelly Pollard

So, what exactly causes an aircraft to age? After all, a machine made of sturdy metals and flexible composites should easily stand the test of time, right? "Not necessarily," says Keith Noles, an airframe engineer at FAA's Aircraft Certification Office in Atlanta, Ga. "Theoretically, a GA aircraft could last indefinitely," says Noles, "provided just about everything on it is replaced. From both an economic and practical standpoint, that would not make sense." Despite this inevitable mortality, the vast majority of GA aircraft are in fact designed under Civil Aviation Regulations (CAR) part 3, which does not mandate service life limit requirements. That all changed in 1969 when fatigue life limits became required for new unpressurized aircraft designs under FAR part 23. (Life limits for CAR 3 pressurized structure were mandated in 1957.) But should we be concerned about an airplane designed prior to life limit requirements somehow exceeding its useful life expectancy? Or, even with newer aircraft, should we still be concerned with how aging can affect more modern construction materials and methods?

Should the owner of an aging GA aircraft be worried? No. But should they continue to look at things they can do to stay proactive with safety? Absolutely.

Both are valid questions and understandable areas of concern for aircraft owners. To address the issue, the FAA, along with industry, has invested considerable time and resources studying various aging factors that can impact aircraft over time. As a result, much has been discovered about corrosion, fatigue, and inspection techniques. All are key factors for mitigating the effects of aging in general aviation aircraft.

***Firewall corrosion damage discovered on a 1978 Piper* Lance.**

So How Old is Too Old?

True, there might be a few more of the figurative gray hairs and wrinkles on the average aircraft these days. But according to FAA Small Airplane Directorate Continued Operational Safety Program Manager Marv Nuss, the GA fleet is aging quite well. "Should the owner of an aging GA aircraft be worried? No. But should they continue to look at things they can do to stay proactive with safety? Absolutely."

Nuss points out that with the more than 20,000 Cessna 172s, many of which are now 40 to 50 years old and still flying, there has been no evidence of any systemic safety issues due to aging. Solid design and construction characteristics are a major factor in the longevity of these aircraft, yet that can also be the cause for complacency.

"There's no requirement for an annual inspection to be any different for an aircraft that's 40-years old," states Nuss. "But that doesn't mean a 40-year-old plane should get the same type of inspection. Certain areas that aren't required to be checked should be."

A prime example of an inspection that overlooked a potentially catastrophic condition happened with the 1978 Piper *Lance* pictured *(below)*. In the photo we see extensive corrosion damage to both the engine mount and galvanized metal firewall. The culprit in this case was a leaking turbocharger and exhaust system. Their proximity to the firewall also helped conceal corrosion during the annual. The lesson from this example is simple: ensure that inspections include all areas of the aircraft, not just the ones that are easy to reach and labeled on a checklist. In the case of the *Lance*, a proper inspection means removing the insulation blanket and upholstery that covers the firewall.

Also keep in mind that as an airplane ages, the inspection methods and techniques may change and require "special attention" inspections. These special inspections, focused on areas prone to aging problems, become even more critical when an aircraft is subjected to conditions like outdoor storage, inactivity, or modifications. If applicable, be sure to expand your normal inspection checklists to include these special attention items. For assistance, recruit help from the manufacturer, a mechanic, or a type club, and be sure to reference Advisory

Circular AC20-106, *Aircraft Inspection for General Aviation Aircraft Owner*. There's also a good baseline checklist at the back of the *Best Practices Guide for Maintaining Aging General Aviation Airplanes* (see link at the end).

Just thinking back to your last physical exam, you can probably sympathize with the need for these intrusive inspections. While thoughts of being poked and prodded are enough to make us shiver, they are a necessary part of caring for an aging body. And as physically and financially painful as these extra-thorough inspections may seem, they can help you (and your aircraft) reap life-saving dividends.

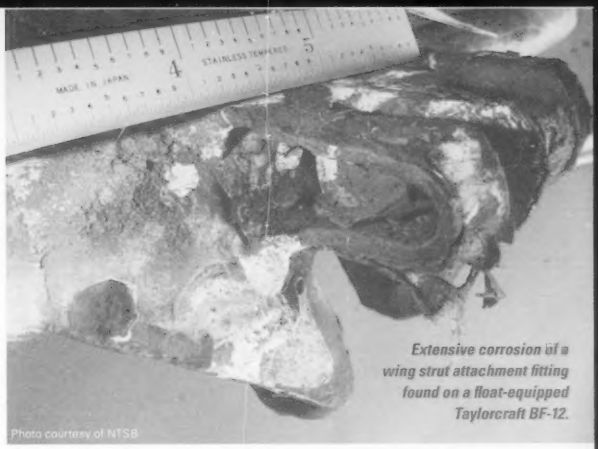


Photo courtesy of NTSB

Extensive corrosion of a wing strut attachment fitting found on a float-equipped Taylorcraft BF-12.

A Corrosive Mix

Imagine waking up one morning and finding your arms covered with red, itchy blotches. Not a pleasant thought, and you'd be ill-advised to ignore it and just hope it goes away. After all, the remedy could be as simple as using an over-the-counter lotion. The key is treating the rash before it becomes worse and perhaps heeding it as a possible sign of a bigger issue. In many ways, finding corrosion on an aircraft can be similar. Knowing what causes it and what corrosion looks like on different parts of your aircraft will help you identify, treat, and prevent it from doing further damage.

Corrosion is essentially the wearing away of metals from a chemical reaction. It is probably the most visible effect aging can have on an aircraft. Many airframe structures use high-strength aluminum alloy coated with a corrosion resistant pure aluminum coating (alclad). However, when you introduce airborne salts and pollutants along with moisture, the alclad can break down, resulting in the deterioration of the aluminum alloy below it. Protective primer is another method used to mitigate corrosion, however, it too is not an infinite protection. Corrosion on aluminum parts will generally appear like a crusty white or gray powder and can be removed by mechanical polishing or brushing with materials softer than the metal.

Another common material in aircraft construction is steel, which exhibits the familiar reddish brown rust when corrosion is present. Corrosion on steel can be controlled by removing it mechanically and by maintaining its protective coating (usually a cadmium or zinc plating).

Your chances of having corrosion are also highly dependent on where an aircraft is flown and stored. For example, owners who operate or store their aircraft in the warm, humid conditions found in coastal states like Florida or Louisiana need to keep a more watchful eye for corrosion. Just take a look at the extensive corrosion found in the photo (*above*) which shows a wing strut attachment fitting from a 1941 float-equipped Taylorcraft BF-12 operated in Oregon.

This corrosion, a byproduct of improper maintenance, inadequate inspections and exposure to water, was cited by the NTSB as being a probable cause for a fatal accident involving this aircraft. During a water landing attempt in July 2007, the weakened left wing strut separated and caused the wing to fold up against the fuselage seconds before the aircraft impacted the water. It was later discovered that the Taylorcraft owner had performed an annual inspection only two months before the accident, but did not catch the deadly corrosion even though it was included in a service bulletin issued earlier that year.

For more detailed photos on corrosion types and control methods, have a look at AC 43-4A, *Corrosion Control for Aircraft*.

Cracks Kill

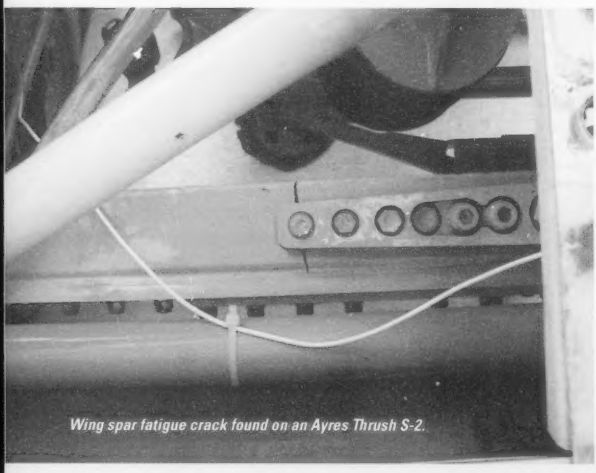
Another leading factor in aging aircraft issues—fatigue—can be a lot harder to detect. The topic made media headlines last April when a Southwest Airlines 737 experienced a four-foot tear in the fuselage midflight. NTSB preliminary findings indicated fatigue cracks were found emanating from at least 42 of the 58 rivet holes connected by the fracture. While many GA aircraft owners are not overly worried about the punishing stress of pressurization common to air carrier operations, there are many other causes of fatigue germane to GA. These include wind gusts, unpaved runways, and yes, the occasional student pilot. If left unchecked, these damaging forces can have deadly consequences.

"Some aspects of aircraft aging and fatigue are 'genetic,' says Nuss. "Just like a human's genetic code predisposes them for a particular ailment or condition, so can an aircraft's design or construction materials." Certain parts and components, like engine supports, or wing spar attachment fittings can become fatigue hot spots. The key here is to know the hot spots specific to your aircraft and to keep these areas thoroughly inspected. A good way of doing this is to stay on top of pertinent FAA and manufacturer-based notices, like ADs, SAIBs, and service bulletins. Type clubs can also help keep you in the loop.

Learn as much as you can about your aircraft. Know where it's been, keep it maintained well, and never stop assessing the need for additional inspections.

The effects of fatigue are also cumulative, meaning airplanes can't heal from being stressed. And since fatigue is not necessarily related to age, even owners of newer aircraft need to be vigilant and proactive in their inspections.

It's also a good idea to have detailed information about your aircraft's history. According to Noles, aging issues aren't limited to the number of years or flight hours an aircraft has accumulated. "Additional considerations," says Noles, "are understanding how and where an individual aircraft is used, and how those factors influence its design characteristics and the likelihood of aging-related damage." Among the many questions you should ask during your research are: Where has the aircraft been geographically? Has it been hangared? Was it flown in any special or severe usage capacity? If that information proves hard to come by, try looking at some of the aircraft's maintenance records. You might find that it once had floats, or belonged to a flight school. The address of the owner or the repair facility should also provide clues to its whereabouts and the climates it has been exposed to.



Wing spar fatigue crack found on an Ayres Thrush S-2.

Test Your Knowledge

What is the most corrosion-prone metal used on aircraft?

a. Aluminum alloys
b. Magnesium alloys
c. Copper-based alloys

Answer: b

Use It or Lose It

Another factor worthy of researching is how *much* an aircraft has been used. "While it is true that special uses like moving heavy loads, low altitude flying, or flight instruction can exacerbate the effects of aging, certain areas of an aircraft can develop problems from being underutilized" says Noles.

It's helpful to think about it from a human perspective as well. How many times have you heard just 30 minutes a day of physical activity is the key to good health? Activity keeps the blood flowing, the joints limber and the muscles strong, just as regular flying keeps the engine parts lubricated and aircraft system components working as intended. In contrast, an aircraft sitting idle on a ramp may have components that deteriorate and age faster than those on a similar aircraft that sees a fair amount of routine flying. Sounds like a good excuse to take your airplane flying (and take yourself to the gym)!

Tools You Can Use

As you can see, there are a great many details to become familiar with when it comes to aircraft aging. Thankfully there are tons of resources and tools you can use to help you become better educated on how to properly care for older aircraft. But if you prefer one-stop shopping, the FAA-

sponsored website (www.aginggeneralaviation.org) provides a single access point to type-specific aging aircraft maintenance information. In addition to providing an extensive list of aging-related documents, training curricula, type club information, and database links, the site also features a "War Stories" section where viewers can read, or even add a personal account of an aging-related aircraft incident.

"There's no silver bullet when it comes aircraft aging problems," notes Nuss. "The best you can do is to learn as much as you can about your aircraft. Know where it's been, keep it maintained well, and never stop assessing the need for additional inspections."

Good advice, for both the body and the airplane.

Tom Hoffmann is associate editor of FAA Safety Briefing. He is a commercial pilot and holds an A&P certificate.

For More Information

Best Practices Guide to Aging GA Aircraft
www.faa.gov/aircraft/air_cert/design_approvals/small_airplanes/cos/aging_aircraft/media/aging_aircraft_best_practices.pdf

FAA's Service Difficulty Reporting Site
http://av-info.faa.gov/sdrx/

FAA Advisory Circular (AC) 43.13-1B, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair
www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/99861

AOPA/Air Safety Institute Online Course for Aging GA Aircraft
http://flash.aopa.org/asf/agingaircraft/swf/flash.cfm?

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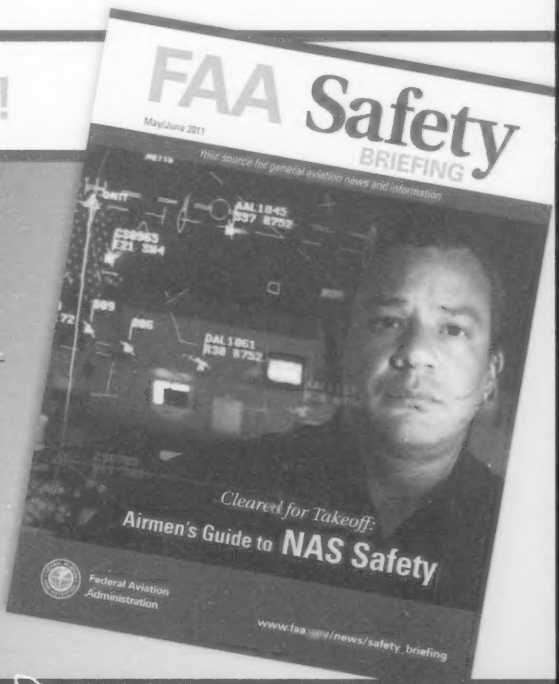

TOM HOFFMANN

Nuts, Bolts, and Electrons

Looking Outside the Toolbox

Take a look at your toolbox. If you're like me, it's easy to feel a sense of pride glancing down at a diverse, hard-earned, and organized collection of well-maintained tools. (Ok, I admit—maybe not always the organized part). Nevertheless, you know that your toolbox has nearly everything you need to help you get the job done, big or small. Or does it? There's often one overlooked tool that may not have a custom slot or case in your kit, but can be vital to successfully completing any size maintenance task: information.

Information, Please

With the virtual explosion of technology in the last decade, you might be surprised to know just how much aviation maintenance information is just a simple click or tap away. By information of course, I'm not just referring to the technical manuals or approved data mechanics are already required to have to perform a repair or alteration—which incidentally, have become vastly more accessible with the aid of computers. Instead, I'm focusing here on the resources that complement that technical data and help AMTs to "look outside the toolbox," especially when it comes to exploring more innovative or efficient ways to perform a task. Besides expanding your knowledge base, the right information can also help sharpen your professionalism and develop leadership skills, both essential components of a successful AMT career.

FAAST Forward. One of the more comprehensive information resources available to AMTs is on www.FAASafety.gov. The Maintenance Hangar section of the website contains everything from safety presentations and online courses, to an exhaustive list of safety tips, references, and regulatory resources. The FAASTeam site is also the central location for information on the AMT Awards Program and the Charles Taylor Master Mechanic Award. Once you create an account on FAASafety.gov, be sure to sign up to receive e-mail maintenance tips and be notified when the quarterly *Nuts and Bolts* (a newsletter written by mechanics, for mechanics) is published.

Find What You Love at FAA.gov. Whether you're curious about becoming an AMT, or need to reference specific engine details from a Type Certificate Data Sheet, www.faa.gov/mechanics is the place to go. Everything from training handbooks, to testing requirements, to a Form 337 can be found on the FAA Mechanics home page. Just follow the Mechanics link from the FAA home page to access all this and more. Every AC, AD, and SAIB you can think of is just a click away. And don't forget to regularly check the Maintenance Alerts (www.faa.gov/aircraft/safety/alerts/aviation_maintenance).

Human Factors. Human factors plays an enormous role in the world of aviation safety. Recognizing this, the FAA created a website—https://hfskyway.faa.gov/—dedicated to raising awareness of this important topic and the many human factors challenges that specifically affect AMTs. Be sure to check out the well-maintained document library that contains hundreds of human factors-related documents and presentations. The site also has a link to www.mxfatigue.com, another online resource to review practical tips about sleep and fatigue management strategies.

Information by Association. Other valuable information resources include aircraft type clubs and aviation maintenance-related associations like the AMT Society, the Aircraft Electronics Association (AEA), and the Professional Aviation Maintenance Association (PAMA). These organizations offer a host of information on IA renewal, career opportunities, online Q&A forums, training videos, as well as many free webinars, like those available on *AMT Magazine*'s site (www.amtonline.com/webinars/). AOPA also offers several maintenance-related safety briefs and reports, as well as some high-quality interactive courses.

You! Knowledge is only good when you put it to use, and more importantly share it, so try to pass on that wisdom to your fellow AMTs when possible. What's your favorite information resource?

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JAMES WILLIAMS

Vertically Speaking

Cranberries to Christmas Trees

The world of aviation has changed dramatically in the last 10 years when it comes to the use of Unmanned Aerial Systems (UAS, formerly called UAV). While UASs have been around for some time, only in the last few decades have they moved into widespread use. They have become a fact of life in military and intelligence circles, and are becoming more and more common in the civilian environment—including local police departments—for homeland security.

For a variety of reasons, UASs have heretofore been less visible in the rotorcraft world. As technology has improved, though, so have the chances for a helicopter UAS. In 2000, the Navy launched the Fire Scout program, which used a converted Schweizer helicopter as a starting point to create one of the first large scale unmanned helicopters. The success of the Fire Scout program led planners to consider using unmanned helicopters to solve one of the biggest problems faced by commanders on today's battlefields: supplying outlying garrisons. Rather than using large convoys and risking lives to accomplish this critical task, the idea was to use unmanned helicopters instead.

Two different approaches are now under development: one by Boeing and another by Lockheed. Lockheed is converting the existing Kaman K-Max helicopter so that it can be flown either by a pilot, by remote, or autonomously. The Boeing A160 Hummingbird, on the other hand, is a clean sheet design that can autonomously deliver supplies or loiter over areas for long periods of time. Each has its strengths and focuses on a slightly different role. The K-Max is more of a hauler, with twice the payload of the smaller Hummingbird. The Hummingbird can haul cargo, but also uses new rotor technology that gives it a quieter noise signature plus longer range and loiter time.

Civilian Service

While these systems could be a huge boon on the battlefield, they could also be a great fit for some civilian operations. "These kinds of systems could remove the danger to a pilot from operating in unfavorable portions of the Height-Velocity (H/V) chart, as they often are during external load operations," explains Rotorcraft Aviation Safety Inspector Eric Carroll. The H/V chart outlines the conditions (i.e., forward airspeed and altitude combinations) that helicopter pilots must avoid to have a reasonable chance of successfully auto-rotating a helicopter in the case of an engine failure. "The nature of the work in hauling large external loads slung under a helicopter means that you are operating slow and low in many cases," Carroll says. "You tend not to have a lot of fuel reserve, so you're trying to get the job done quickly and not necessarily climb to higher altitude to stay above the curve. That, combined with the lower speeds required when carrying a long line load, leaves you very close to the curve.

"It's not illegal to operate in areas not recommended on the chart since it's not a certification limitation," Carroll explains. "But it leaves you in a vulnerable position should an engine failure occur."

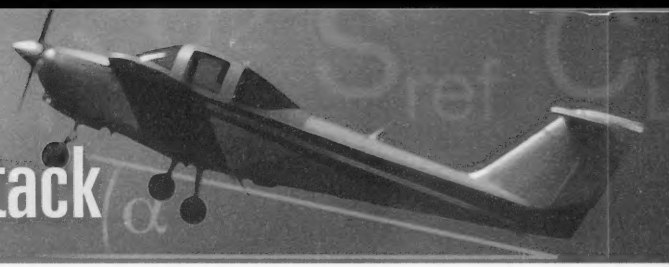
While Helicopter UASs are not yet ready for widespread civilian use, there is still a lot of potential. "These kinds of systems may never be suitable for operating in congested areas, but there are a lot of operations like logging and other agricultural activities that are often conducted in remote areas," Carroll says. Common operations like hauling cranberries and Christmas trees could easily be done by these UASs, as it would be close to their battlefield resupply role. "That would spare human pilots from doing monotonous and fatigue-inducing flights that are necessary for those businesses," says Carroll. "That alone improves the safety of those operations."

The days of the helicopter pilot are by no means coming to an end, but now they may have a robotic assistant in the form of UAS. That makes flying safer, and lets pilots do the more complex work that demands their human thinking skills.

James Williams is FAA Safety Briefing's assistant editor and photo editor. He is also a pilot and ground instructor.

TOM HOFFMANN

Angle of Attack



Eradicating the Incursions

FAA Employs New Efforts to Improve Runway Safety

Can you recall the last time you saw someone run a red light, or blow through a stop sign? It's frightening to imagine what may have happened had you started moving in the path of the wrongdoer just a few seconds sooner. Pilots experience similar types of events at airports of all shapes and sizes across the nation. Called runway incursions (RI), these events are defined as any unauthorized presence on a runway, regardless of whether or not an aircraft, vehicle or pedestrian presents a potential conflict to an aircraft authorized to land, take off, or taxi on a runway. And like a vehicle that disobeys a traffic signal, the results of a runway incursion can also be deadly.

Since a "call to action" effort launched in 2007, the FAA has focused extensively on reducing the number and severity of RIs. Thanks in part to those efforts, the number of serious RIs—classified as Categories A and B—has dropped 50 percent for two consecutive years (from fiscal year 2008 to 2010). Although runway safety has improved greatly over the last decade, RIs remain an active threat and have even increased slightly in FY 2011.

To further enhance awareness of the RI issue, the FAA and several industry partners and associations have worked together to implement new policies designed to target learning opportunities during the pilot training process. Among those initiatives will be a series of runway safety test questions added to all pilot knowledge tests. Many of the new questions are scenario-based and will include graphics to more accurately probe a student's knowledge of proper airport surface movements. Once validated, the runway incursion avoidance questions will be added to the test question banks. Samples of these questions will be made available for preview and comment later this fall on the Training and Testing section of the FAA website: (www.faa.gov/training_testing/testing/airmen/test_questions/). Address comments to: afs630comments@faa.gov.

To complement the written exam changes, the Practical Test Standards (PTS) for private, commercial, and flight instructor certificates will also soon be modified to include a task on avoiding runway incursions. This task will test a candidate's understanding of how to maintain situational awareness during taxi operations, as well as their ability to effectively manage and mitigate the possible challenges and distractions during taxi. Other items students may be asked to demonstrate include an understanding of low visibility operations, hold short lines, sterile cockpit procedures, and both towered and non-towered airport operations. Changes to the PTS for other pilot certificates will be evaluated at a later time.

In conjunction with these changes (expected to begin later this year), a number of FAA resources will be updated to include additional information for pilots on the importance of runway safety and runway incursion avoidance procedures. This includes the *Pilot's Handbook of Aeronautical Knowledge*, along with updates to Advisory Circulars (AC) 91-73, *Single Pilot Procedures During Taxi Operations*, and 120-74, *Flight Crew Procedures During Taxi Operations*.

The FAA also released a subject-related Safety Alert for Operators (SAFO) on June 10, 2011. The SAFO includes a list of practices that can help mitigate hazards and improve safety during airport surface operations. Among the topics included in the alert are: planning, crew resource management, and communication. To review any of these resources, go to www.faa.gov.

The FAA Safety Team (FAASTeam) continues to provide an important source of runway safety information as well by providing a series of runway safety tips online and through emails. If you haven't already signed up to receive these tips, be sure to visit www.faasafety.gov. You can also sign up for events and seminars in your local area, which often highlight runway safety techniques.

The FAASTeam also will be involved with redesigning remedial training administered to pilots who have committed an RI. To assist designated pilot examiners (DPE) and CFIs with

administering this training, a master RI lesson plan is being developed by FAASTeam program managers, which will form the basis for all remedial runway incursion training programs.

The FAA is committed to preventing RIs and will continue to seek out new ways of educating pilots on the importance of runway safety. In the meantime, take advantage of as many tools and resources as you can to make sure your next flight is a safe one. Fly (and taxi) safely!

Tom Hoffmann is associate editor of FAA Safety Briefing. *He is a commercial pilot and holds an A&P certificate.*

***Here is one of the sample test questions on runway safety that will be posted online this fall at* www.faa.gov/training_testing/testing/airmen/test_questions/.**

The sign shown is an example of:

A) a mandatory instruction sign.
B) runway heading notification signage.
C) an airport directional sign

Answer: A

For More Information

FAA Office of Runway Safety
www.faa.gov/airports/runway_safety

AOPA/Air Safety Institute Course on Runway Safety
http://flash.aopa.org/asf/runway_safety/swf/flash.cfm?

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Aviation Maintenance Alerts (Advisory Circular 43-16A) provide a communication channel to share information on aviation service experiences. Prepared monthly, they are based on information FAA receives from people who operate and maintain civil aeronautical products.

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- cracked rudder bar support on the Piper PA-28-235 *Cherokee Pathfinder*
- cracked flap nose rib on the Beechcraft A36 *Bonanza* and 58 *Baron*
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Flight Forum

U.S. National Aviation Academy

Mr. Allen, I am convinced, like you, that in the future most pilots and technicians for general aviation are not going to come from the armed forces. For this reason, all actions should be directed at giving a university-level professional formation [training] for these future generations of aviators. This would assure safety for all operations. I add to your arguments that a university should give ongoing education: this means that it not only gives the original training to them but also it keeps them updated through courses and seminars.

Osvaldo Sarabia Vilches
Director, Academia de Ciencias Aeronáuticas

Thanks for the feedback; continuing education is indeed very important. - John Allen

Mr. Allen, I read with great interest your column in the Jul/Aug 2011 issue of *FAA Safety Briefing* regarding 'Building for the Future.' I would applaud a national academy of aviation sciences. I feel, as I believe you and many others in our industry do, that our field has allowed its efforts to stagnate in recruiting the best and brightest talents and young minds for a myriad of reasons, many of which you covered in your article. I would counter, however, from the perspective of both a professional AMT and private pilot, that one might consider a mechanic as skilled in cognitive reasoning as a pilot is. After all, don't both require high levels of dexterity, problem solving, and competency in core elements of mathematics and sciences? Wouldn't we be better served by integrating a Bachelor's level program for AMTs as opposed to constantly rehashing the stereotype of the Pilot vs. Mechanic caste system that has been a fixture of our industry for decades? Perhaps as a nation we have failed to regard skilled labor with the significance it deserves. As aircraft and aviation technologies become more and more sophisticated in their developmental evolutions, it would certainly behoove us to consider that in order to get the best and brightest minds interested in the aviation professions, we must also afford all those persons the dignity and respect that the aviation and aerospace communities as a whole have to offer. Let's all work together to ensure that the next generation of aviation and aerospace students, whether pilot or AMT, are regarded as equals.

Michael Balka
A&P/IA, Private Pilot

Thanks for the input Mike, and I agree. After publication of the article, I have refined the idea of the US National Aviation Academy to propose a bachelor's degree along with an A&P certificate. I believe future tech ops folks will benefit from the academic rigors of a 4-year degree that will provide them better skills in abstract thinking and logic which will also make them better communicators, all skills necessary in their futures. In fact, I have the opportunity to pitch this idea at a conference with many aviation academic institutions. - John Allen

Mr. Allen, I enjoyed your article in FAA Safety Briefing this month [Jul/Aug 2011], and especially liked your idea of an aeronautical academy. Unfortunately, I'm afraid that is a bridge too far. Successful graduation from a military academy includes a dose of patriotism and tradition. Even if your academy did everything you asked, there is no dose of honor, patriotism, public respect, or any of the other things a military academy graduate gets. There is also no job for 20 to 30 years with an early retirement.

We already have something like your dream academy - Embry Riddle Aeronautical University. It doesn't make mechanics, but the military will still do that in a similar fashion to the past. It does make pilots and engineers. Perhaps the best thing you can do as a high level government leader is find a way to get the government to help outfits like ERAU accomplish their goals without government intervention and regulations.

Paul Mulwitz
Camas, WA

Thanks for your comments, Paul. I didn't go to a military academy but was the recipient of fine academic education and USAF pilot training, enabling me to fly for 30 years and recently retire as a General Officer. I share your concern, but we must have courage, take some risk and have stronger

curricula that have much heavier orientations in discipline, CRM, acrobatics, etc, that produce pilots with much higher airmanship capabilities and tech ops personnel with better analytic and communication skills. — John Allen

Rational Decisions

You struck a real chord with the Postflight segment in the Jul/Aug 2011 issue of *FAA Safety Briefing*. I cancelled a planned night training flight just last Sunday, when rare evening thunderstorms rolled through the Las Vegas valley – after the third successive weather delay. I have a "Three Strikes" policy, too. I know that little warning bell in the back of my mind – fuzzy, yet distinct (once I learned to recognize it) – it has saved my skin a number of times, and now I'm hyper-attuned to it. I recently read "Blink", and found Gladwell's observations so germane to the pilot's "pit of stomach" or "warning bell" feeling that I made it the subject of one of the ground school sessions I teach. It was most satisfying to see your excellent work highlight this nebulous-but-relevant warning sign to more of us involved in aviation.

Mike Radomsky

President Emeritus, Cirrus Owners & Pilots Association

Thanks for the feedback; glad you found the article helpful.

The three strike policy is irrational and not supported by your article. The flight in the first DA-40 had one strike, no transponder, and it was out. The flight in the second DA-40 had one strike, a 45 minute open ended delay, and it was out. A third strike was not clearly defined in the article. Both flights were planned based on a common mission but were independent flights. Both were rationally cancelled for one strike. Scrubbing for three strikes is irrational. Scrubbing for one valid strike is good judgment.

John Bassett

Private Pilot

I should have been more explicit in defining the "strikes," which were:

1. *No transponder.*
2. *No fuel on board.*
3. *Long delay.*

Like a number of other pilots I know and respect, I do stand by my policy of three strikes. There have been occasions when just one or two were sufficient for me to cancel. Thanks for reading the magazine, and best wishes in your flying.

Radio Communication

I am very appreciative of the high level of quality that FAA Safety Briefing magazine has achieved and is maintaining! In 'Flight Forum' in FAA Safety Briefing magazine July August 2011 under 'Communication Etiquette' in reference to the previous article "What Not to Say", the author mentions "taking the active" as inappropriate terminology. I agree. If seriously trying to eradicate "taking the active" or at least modifying it to something more useful to other pilots, it might be useful to expurgate "taking the active" altogether from FAA publications. I know how difficult it must be to get these things fixed, but I applaud the efforts, since as a flight instructor, I cringe when I hear the phrase. Just including the runway number in the takeoff radio call would be a great help to other traffic, but the best solution is to remove "taking the active" altogether.

Tom Guyton

Thanks for the suggestion; we will pass it on to colleagues responsible for these publications.

FAA Safety Briefing welcomes comments. We may edit letters for style and/or length. If we have more than one letter on a topic, we will select a representative letter to publish. Because of publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards District Office or air traffic facility. Send letters to: Editor, FAA Safety Briefing, AFS-805, 800 Independence Avenue, SW, Washington, DC 20591, or e-mail SafetyBriefing@faa.gov.

Let us hear from you—comments, suggestions, and questions: e-mail SafetyBriefing@faa.gov.

OR

Use a smartphone QR reader to go "VFR-direct" to our mailbox.

SUSAN PARSON

Postflight

Extending Your Range

Have you ever noticed how pilots seem to think in binary code? We tend to frame our choices in "either/or" terms that are strikingly similar to the zero/one, and off/on terms best known to computer programmers. Think about it for a moment. It may have started when you first visited a flight school to sign up for lessons: High-wing or low-wing? Glass panel or steam gauges? Powered or non-powered? Tricycle or taildragger?

It didn't stop there. At an early point in your aviation education and training, you were exposed to the famous go/no-go dichotomy. Then there is that never-ending aviation debate: Some insist that power controls airspeed and pitch controls altitude; others assert the opposite. Don't worry. I'm not going there, if only because I don't relish fielding all the letters we would get on that subject.

Not Just Ones and Zeros

Just as I teasingly remind my engineer friends that there is an infinite number of fractions between zero and one – not to mention an infinite string of numbers *beyond* them – I like to remind my fellow pilots that the range of available choices is a lot broader than our "either/or" phrasing might suggest. A major goal of this issue is to illustrate that very point.

I can't think of a single area where an aviation choice appropriate to a given time or circumstance is cast in stone.

I can't think of a single area where an aviation choice appropriate to a given time or circumstance is cast in stone. I started my flight training with a high-wing, two-place Cessna 152, mostly because it was the least expensive trainer in the fleet. Eventually I checked out in a low-wing Piper *Warrior* to accommodate a passenger's preference. I learned to fly instruments on steam gauges, but was among the first to check out in glass when the school's first Garmin G1000 equipped aircraft arrived. Similarly, I learned to fly with the tricycle gear that is, ironically, now more conventional than the so-called "conventional gear" on a tailwheel aircraft. But that didn't mean I couldn't eventually learn to fly such a plane. As I regularly point out in safety seminars, the go/no-go decision is a lot more nuanced than it sounds. Once en route, it becomes a continue/divert decision, with all the possibilities that diversion entails.

A Range of Training Options

A more recent addition to aviation's binary code mode is the puzzling – to me, anyway – debate over the traditional maneuvers-based training (MBT) "versus" scenario-based training (SBT). While it is true that both the FAA and the flight training community have put more emphasis on SBT in recent years, that doesn't mean that instructors or pilots have to choose and use just one training method.

A more flexible and more useful approach is to frame this particular "either/or" in the same purpose-oriented way you would use to decide which airplane to rent. If you are going out to fly solo in the local area, a two-seater is all you need. For a family vacation to the beach, though, you are more likely to look at a four- to six-seat plane with greater range and hauling capacity.

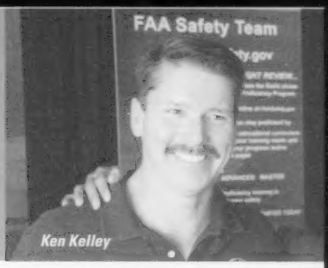
Similarly, it seems to me that the choice of MBT or SBT training methods depends on what you are trying to learn at any given time. If you are trying to master the mysterious art of landing, you are more likely to benefit from a very focused session of that maneuver. For cross-country training, by contrast, a structured scenario-based training session is much more effective in helping you apply and correlate the many moving parts of this particular activity.

General aviation offers an endless array of possibilities for expanding your horizons. So drop the ones and zeros from your thinking, and use all available ways to enjoy the wide world of flying.

Susan Parson (susan.parson@faa.gov, or @avi8rix for Twitter fans) is editor of FAA Safety Briefing *and a Special Assistant in the FAA's Flight Standards Service. She is an active general aviation pilot and flight instructor.*

JAMES WILLIAMS

FAA Faces



Ken Kelley

Every aviation career starts somewhere. For many, it starts with bedrooms adorned with posters and scale models. It's not just a hobby, it's a passion. And so it was with Ken Kelley. "I've always had a strong interest in aviation," Kelley explains. "Even as a kid, I was always building model airplanes and rockets." He continues, "When I was in high school, I started learning to fly but I didn't manage to finish until later."

Kelley attended Shasta College to pursue his airframe and powerplant mechanic certificate. In 1983 he completed his training and joined the aviation maintenance world. His first stop was Woodland Aviation in Woodland, California, which was a Beechcraft authorized dealer and repair facility. While there he came under the tutelage of Doug Barton. "He was a great mentor," Kelley says. "He taught me so much in regards to being a good technician." Also while at Woodland, Kelley finished his flight training and earned his private pilot certificate in 1990.

Kelley eventually worked his way up to Chief Inspector at Woodland before deciding it was time for something different. In 1991, he left to join IASCO Flight Services in Redding, California, as the lead mechanic. Within a year and a half, he had become the Maintenance Manager at IASCO. "I enjoyed five very good years turning the shop around by being able to hire some very talented mechanics from the local area," Kelley says. Things went well until the lease expired and the shop was forced to close in 1997.

After a brief stay at El Aero Services in Carson City, Nevada, Kelley was hired on as an Airworthiness Aviation Safety Inspector with the FAA. He later joined the FAA Safety Program, eventually becoming an FAA Safety Team (FAASTeam) Program Manager.

Along the way he also joined the ranks of aircraft owners when he bought a Cessna 140. "I love to fly and to work on airplanes so it seemed like a good idea," he explains. Being an A&P, a pilot, and an aircraft owner gives him broad common ground with the GA community. That, plus his desire to work with the public, led him to become part of the National Exhibit Team that staffs events like Sun 'n Fun and AirVenture.

"Some of my best experiences with the FAASTeam have been when I've had the honor to present airmen with the Charles Taylor Master Mechanic Award and/or the Wright Brothers Master Pilot Award," Kelley says. "These awards recognize true dedication and I wish more people knew how important it is to keep working to increase your knowledge base and keep up to date.

"That's what the FAASTeam is here for," continues Kelley. "We want to help you keep learning because continued education is so important to improving safety."

The issue Kelley and the rest of the FAASTeam face is challenging indeed. Kelley stresses that the FAASTeam is trying different avenues to reach out to GA pilots who don't attend local meetings by offering on-line training, videos on demand, and webinars. "All of these are designed to get more pilots involved in safety and help them make the right decision that may save lives," says Kelley.

We want to help you keep learning because continued education is so important to improving safety.

But none of that works without your help and feedback. So next time you're at an aviation event, stop by the FAA area and see if Ken Kelley is there. Feel free to say hi and ask him how he can help you — because he really is there to help.

James Williams is FAA Safety Briefing's assistant editor and photo editor. He is also a pilot and ground instructor.

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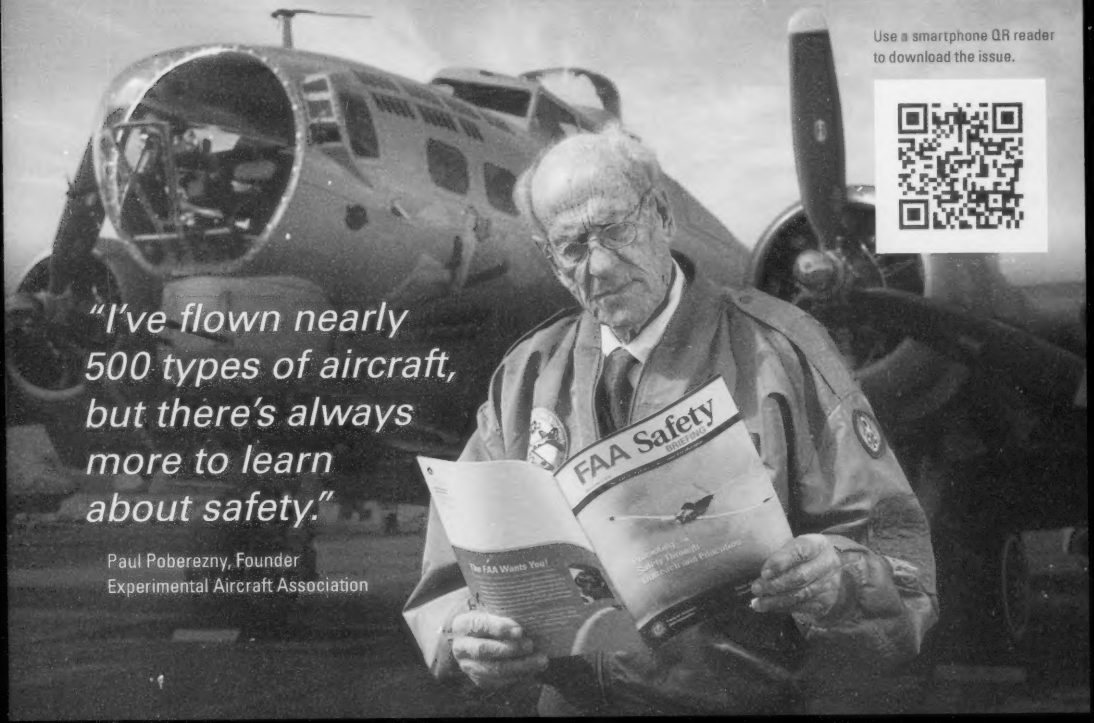

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"I've flown nearly 500 types of aircraft, but there's always more to learn about safety."

Paul Poberezny, Founder
Experimental Aircraft Association